HumRRO Report No.
DFR-03-88

HumRRO
Human Resources Research Organization

Comparisons Between KCCT and NAEP: Assessment Frameworks, Item Format, Item Content, Test Administration, Scoring, and Reporting

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November 2003

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Acknowledgements

This report would not have been possible without the efforts of some of Kentucky's expert reading and mathematics teachers who took part in the workshop. Their attention to detail, willingness to tackle challenging tasks, and thoughtful comments were greatly appreciated. Any misinterpretation of their work rests solely with HumRRO researchers.

We also would like to thank Rhonda Simms of the Kentucky Department of Education, who provided the teacher contacts that made this project possible.

Finally, we would like to thank Cindy Owen, Kentucky's NAEP State Coordinator, for reviewing the section on test administration differences and providing insightful comments and suggestions.

Abstract

The federal No Child Left Behind (NCLB) legislation requires that all states design and implement assessment systems to gauge student proficiency. NCLB requires that states test students in grades 3-8 in reading and mathematics each year. There are consequences for schools that do not make progress toward proficiency goals by the year 2014. Each state can define proficiency in its own way, but NCLB also requires that all states participate in the National Assessment of Educational Progress (NAEP), which will be used as a check on the progress reported by the states. The manner in which NAEP will be used as a comparison for state-level results is unclear. However, since all states must measure student proficiency levels and all must also participate in NAEP, such comparisons are inevitable.

This report examines some of the similarities and differences between NAEP and the Kentucky Core Content Test (KCCT). Content standards, performance standards/achievement levels, item content, item format, test administration, and score computation are discussed. Much of the data for the report came from a three-day workshop during which expert Kentucky teachers performed several tasks designed to help them compare NAEP standards and items with KCCT. Teachers reported meaningful differences in all investigated areas. These differences represent a considerable challenge for direct comparisons of Kentucky's performance on KCCT to its performance on NAEP.

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Comparisons Between KCCT and NAEP: Assessment Frameworks, Item Format, Item Content, Test Administration, and Reporting

Introduction

The federal No Child Left Behind (NCLB) Act of 2001 requires that students in grades 3-8 take state-level tests each year in reading and mathematics. Each state is also required to take part in the reading and mathematics portions of the National Assessment of Educational Progress (NAEP) every two years. The results of the NAEP tests will be compared to achievement gains on state-level tests, such as the Kentucky Core Content Test (KCCT), a component of the Commonwealth Accountability Testing System (CATS), although the NCLB legislation did not specify how these comparisons would be made.

To explore the relationships between NAEP and KCCT, the Kentucky Department of Education (KDE) hired the Human Resources Research Organization (HumRRO) to investigate six areas:

1. Content standards—map the overlap between NAEP content and KCCT content using NAEP frameworks and Kentucky Core Content for Assessment;

2. Performance standards/achievement levels—identify similarity in achievement level expectations using sample released items;

3. Item content—using all test forms (e.g., for Grade 4 reading, Grade 8 mathematics), map operational KCCT items to NAEP frameworks;

4. Item format—judge similarity of item design (multiple choice and open response) using released items;

5. Test administration—compare administration procedures, judging likely impact on student preparation, motivation, and performance;

6. Score computation—compare scoring and reporting methods including inclusion criteria.

KDE and the National Technical Advisory Panel for Assessment and Accountability (NTAPAA) will use the information from this study to make recommendations for comparing Kentucky NAEP and KCCT data.

Methodology

HumRRO used expert teachers to help investigate the first, second, and fourth of the above areas and used the results of their work in completing the third comparison. These teachers also serve on the state's Content Advisory Committee (CAC) for elementary and middle school mathematics and reading and were recommended by KDE. For the past several years, CAC teachers met to help write items for the KCCT. They also have a great deal of experience in

working with the Core Content for Assessment (KDE, 1999). HumRRO invited the teachers to attend a three-day workshop, during which they were to investigate the above areas by working through five[1] tasks (described in the following section). Of the 20 who were invited, 14 participated, with 2 in elementary reading, 3 in middle school reading, 4 in elementary mathematics, and 5 in middle school mathematics. Each group worked independently from each other, although there were occasional opportunities for same-content groups to meet for discussion. One HumRRO researcher was assigned to each of the four groups as a facilitator. The workshop was held in HumRRO's Louisville office June 9-11, 2003.

The fifth and sixth areas were completed by HumRRO researchers, who consulted with those familiar with KCCT and NAEP test administration and scoring.

Workshop Tasks

At the beginning of the workshop, HumRRO researchers gave each group copies of NAEP and KCCT Core Content for Assessment standards, or frameworks, and released items from both tests. Typically, standards describe content that is eligible for inclusion on the assessment and released items show examples of how those standards are assessed. To more easily distinguish between the two systems, all NAEP standards and released items were printed on yellow paper, while KCCT standards and items were printed on blue paper (see Appendix A for NAEP and KCCT websites used). Teachers were also given agendas and task descriptions to help them investigate comparisons between NAEP and KCCT (see Appendix B).

- Task 1—Determining Content Overlap. The first task that teachers completed was examining the content overlap between NAEP and KCCT. Teachers cut apart NAEP and KCCT standard sets into individual topics/standards. Teachers attempted to match standards with each other. Standards for which there was an exact match were placed in Group 1, and standards that were a close match, or about which teachers were unsure, were placed in Group 2. KCCT-only standards were placed in Group 3, and NAEP-only standards in Group 4. Researchers instructed teachers to try to resolve the matches about which they were unsure. When the sorting and matching were completed, teachers attached the standards onto separate pieces of poster paper designated as Group 1, Group 2, etc. In this way, they created a visual display of the content overlap between the two testing systems. Note that some exact matches were one-to-one matches between NAEP and KCCT topics while other exact matches linked several topics. One KCCT topic might be an exact match to several NAEP topics, or vice versa. These were categorized as exact matches.

- Task 2—Matching Test Items to Standards. Next, researchers gave each group of teachers a set of released test items from NAEP and KCCT. Teachers matched items to the standards they most closely represented. Teachers attached the released items to the standards on the poster paper created in Task 1.

- Task 3—Sorting Test Items by Cognitive Complexity. Researchers gave teachers a fresh set of released test items from both testing systems, along with clean sheets of

[1] Reading groups completed a sixth task specific to reading.

poster paper, for Task 3. Teachers were instructed to place individual items on a continuum from "simplest" to "most complex." Researchers were careful to explain the difference between the terms "easy" and "simple" and between "hard/difficult" and "complex." For example, an item might be considered difficult if one does not know the answer, even though it may be a relatively simple question that only requires the recall of a particular fact. Instead, researchers asked teachers to focus on what cognitive skills or abilities were being required by each item and to place the items accordingly. Typically, teachers glued several pieces of poster paper together to create enough space for the continuum before sorting items by cognitive complexity. Researchers also encouraged teachers to write notes explaining their reasons for placing items where they did.

- Task 4—Developing a Hierarchy or Taxonomy. Using the continuum created in Task 3, teachers established cutpoints that marked significant shifts in cognitive complexity. Again, researchers encouraged teachers to write notes or descriptions explaining their reasoning for the cutpoints on their hierarchy. Most teachers were familiar with Bloom's Taxonomy (1956) and based their own taxonomies on that structure.

- Task 5—Comparing Item Types. Researchers gave teachers fresh copies of the released items. Teachers examined items by type (multiple choice and open response/constructed response) to determine whether there were significant differences between the two testing systems in the way multiple-choice and open-response questions were written. Some differences, for example, might appear in the multiple-choice distracters or language used. HumRRO researchers documented their discussions regarding item differences.

- Task 6—Examining Reading Passages. This task was designed for reading teachers, who examined reading passages for differences in length, difficulty, language load and vocabulary to determine whether selections on one test were more challenging for students than the other. Again, HumRRO researchers documented discussions that took place.

Task 1 supports the content standards comparison, Tasks 2, 3, and 4 the performance standards comparison, and Tasks 5 and 6 the item format comparison.

Results

This section presents workshop results organized first by comparison examined (e.g., content standards overlap, performance standards, etc.), then by workshop task (when applicable), and finally by content area/grade level.

Content standards

Task 1—Determining Content Overlap

This section presents summary information arranged by subject. Tables documenting the actual matches between KCCT and NAEP content standards are found in Appendix C; they are arranged by grade, subject, and degree of match.

Reading. Elementary and middle school workshop participants documented two main areas of difference. The first difference is the grade levels tested. While both NAEP and KCCT reading assessments are given to fourth-grade students, there is a one-year difference between the tests at the middle school level, with seventh-grade students taking KCCT and eighth-grade students taking NAEP. The second area of difference is the type of reading assessed. KCCT assesses four types of reading—literature, informational, persuasive, and practical/workplace—at both grade levels, while NAEP assesses only two (literature and informational) at the fourth-grade level and three (literature, informational, and practical/workplace) at the eighth-grade level. NAEP does not assess reading using persuasive passages at all.

Elementary workshop participants also noticed that KCCT has a reading skills component, while NAEP does not. This component assesses students' reading skills in five areas: (1) word recognition strategies, (2) knowledge of synonyms, antonyms, homonyms, and compound words, (3) the multiple meanings of some words, (4) the use of prefixes and suffixes with base words, and (5) the author's purpose in using capitalization, punctuation, boldface type, italics, and indentations. These five skills are tested using each of the four types of reading assessed by KCCT. These teachers also said that some NAEP reading standards emphasize writing more than reading. In particular, they focused on two sample questions that accompany NAEP standards: "How do the first events help you predict the ending?"(Literary Text—Major Events X Examining Content and Structure) and "How does the author show you that the main idea is important?" (Informational Text—Supporting Ideas X Developing Interpretation). Note that teachers may have focused on the sample questions rather than on the standards themselves. It is possible that if another type of sample question had been used, they might not have felt that writing, rather than reading, was being emphasized.

Table 1 and Table 2 present summary information about the number of KCCT and NAEP reading content standards by grade level that exactly match, partially match, or do not match at all, as determined by the CAC teachers participating in the workshop. Table 1 shows a greater proportion of KCCT Grade 4 reading standards that do not match any NAEP standards, while Grade 7 reading standards have a greater proportion of exact match. The bulk of the non-matching KCCT standards in Grade 4 come from material that is assessed by KCCT but not by NAEP, such as the five reading skills and the two types of reading mentioned previously.

Table 1. Degree of match of KCCT reading content standards to NAEP reading content standards

		Degree of match to NAEP reading content standard(s)		
	Total number of KCCT standards	Exact	Partial/unsure	None
Grade 4	38	10 of 38 (.26)	4 of 38 (.11)	24 of 38 (.63)
Grade 7	61	37 of 61 (.61)	5 of 61 (.08)	19 of 61 (.31)

Table 2 presents similar information about the degree of match of NAEP reading standards to KCCT reading standards. Here, we see that the CAC teachers categorized a higher proportion of NAEP standards as exactly matching KCCT standards, with a correspondingly lower proportion of NAEP standards not matching KCCT standards. While neither set of standards is a subset of the other, these results are an indication that Kentucky's Core Content for Assessment represents a broader set of curricular topics than do NAEP standards.

Table 2. Degree of match of NAEP reading content standards to KCCT reading content standards

		Degree of match to KCCT reading content standard(s)		
	Total number of NAEP standards	Exact	Partial/unsure	None
Grade 4	39[1]	19 of 39 (.49)	12 of 39 (.31)	8 of 39 (.21)
Grade 8	60	53 of 60 (.88)	7 of 60 (.12)	0 of 60 (.00)

[1]Actual number of NAEP standards is 40; 1 was inadvertently omitted

Mathematics. As in reading, mathematics participants found differences between the two frameworks. For example, the KCCT framework contains four content areas (number/computation, geometry/measurement, probability/statistics, and algebraic ideas, each of which are divided into concepts, skills, and relationships), while the NAEP framework contains five content areas (number sense, properties, and operations; measurement; geometry and spatial sense; data analysis, statistics, and probability; and algebra and functions). This difference in the way frameworks were divided did not seem to be a problem for participants, however. A second difference noted is the grade in which elementary students are assessed: fourth-grade students take NAEP and fifth-grade students take KCCT. However, both tests are given at the eighth-grade level.

Table 3 and Table 4 present the degree of match between KCCT and NAEP math content standards. Elementary mathematics participants elected to approach this task somewhat differently from other participants by omitting the "partial match" category. They stated that they believed standards either matched completely or did not match at all, leaving no room for partial matches. Middle school participants, on the other hand, used the "partial match" category in their sorting. In some instances, they also used the same standard for more than one degree of match, as when they categorized the same content standard as both an exact match to one standard and a partial match to another standard. For the sake of these tabulations, we credited the higher degree of match (for example, a standard categorized as both an exact match and a partial match appears only as an exact match in the following two tables).

Middle school math teachers liked the way KCCT standards were divided into concepts, skills, and relationships. They felt that these built on each other in that students first had to understand the concepts before they went on to the skills. They also noted that the NAEP framework did not have standards comparable to the concept standards in KCCT. The breadth of curricular topics is more similar in math than in reading.

Table 3. Degree of match of KCCT math content standards to NAEP math content standards

		Degree of match to NAEP math content standard(s)		
	Total number of KCCT standards	Exact	Partial/unsure	None
Grade 5	59	34 of 59 (.58)	N/A	25 of 59 (.42)
Grade 8	54	33 of 54 (.61)	10 of 54 (.19)	11 of 54 (.20)

Table 4. Degree of match of NAEP math content standards to KCCT math content standards

		Degree of match to KCCT math content standard(s)		
	Total number of NAEP standards	Exact	Partial/unsure	None
Grade 4	56	50 of 56 (.89)	N/A	6 of 56 (.11)
Grade 8	102[1]	60 of 102 (.59)	13 of 102 (.13)	29 of 102 (.28)

[1]Actual number of NAEP standards is 103; 1 was inadvertently omitted

Performance standards/achievement levels

This area of comparison between the NAEP and KCCT tests comprises three workshop tasks: Task Two—Matching Test Items to Standards, Task Three—Sorting Test Items by Cognitive Complexity, and Task Four—Developing a Hierarchy or Taxonomy. Because Tasks Three and Four are closely intertwined, they will be discussed in the same section rather than separately. Workshop participants were given freedom in the way they sorted items into categories and developed hierarchies, so differences among the four groups are obvious.

Task Two—Matching Test Items to Standards

For this task, teachers used a complete released KCCT test form from 1999 for the appropriate grade/subject as well as the most recent released questions from the NAEP website (http://nces.ed.gov/nationsreportcard/itmrls/pickone.asp). However, we note that the NAEP items did not constitute a complete released form.

Teachers cut apart released forms from KCCT and NAEP into individual items and matched them to the standard that best captured the item's content. They then attached items to the appropriate standards. Tables containing NAEP released items matched to KCCT content standards are found in Appendix D. KCCT released items were matched as a warm-up activity designed to give workshop participants familiarity with the items. Those results were not tabulated.

Task Three—Sorting Test Items by Cognitive Complexity

Task Four—Developing a Hierarchy or Taxonomy

These two tasks were highly related, and they are discussed in one section. Three tables are presented for each grade/subject: The first shows how NAEP and KCCT released items were grouped according to cognitive complexity, the second shows samples of released NAEP and KCCT test items arranged by cognitive complexity, and the third presents participant-developed hierarchies.

Elementary reading. Elementary teachers initially sorted released test items into 11 groups, with Group 1 representing the simplest items and Group 11 representing the most complex. Table 5 shows how teachers sorted the items by group and by item origin (KCCT or NAEP). It shows that teachers placed the bulk of the KCCT items in the first two groups, with the remainder of the KCCT items being fairly evenly distributed across the other 9 groups. NAEP items showed a somewhat different distribution, with the bulk of the items in the middle groups and few in the lower and upper groups.

Table 5. Elementary reading released item distribution by cognitive complexity and item origin

	Grp 1	Grp 2	Grp 3	Grp 4	Grp 5	Grp 6	Grp 7	Grp 8	Grp 9	Grp 10	Grp 11
KCCT items	8	7	1	2	2	1	2	1	2	2	2
NAEP items	0	2	4	5	1	3	5	4	4	1	0

Teachers offered an explanation for some of the variance between the two frameworks. They stated that Kentucky's test assesses students on skills measured by lower level questions, thus accounting for the large number of questions found in the lower groups. NAEP, on the other hand, states that it "does not report on strategies such as finding a detail or summarizing a plot" (p. 5, Reading Framework for the 2003 National Assessment of Educational Progress).

Table 6 presents a sample of released items organized by cognitive complexity and origin. Note that items progress in complexity rather than difficulty, from recall to more challenging activities such as analysis, synthesis, and evaluation. The purpose of this table is to illustrate the nature of the hierarchy. Only a small proportion of the items classified is presented.

Table 6. Elementary reading sample released items by cognitive complexity and origin

Sample NAEP released items	Sample KCCT released items
Group 1—Simplest level of cognitive complexity	
None selected	What did Robinson Crusoe use to make his baskets? A. roots B. branches C. clay D. grass
Group 2	
Just after molting, how does a blue crab increase in size? A. Its body absorbs water B. It drops off its legs and grows new ones C. Its shell grows the way human bones do D. It eats large quantities of food	In this passage, PIPE means A. a water pipe B. to be quiet C. a stove pipe D. to be warm
Group 3	
A colonist would probably have used a foot stove when A. going on a trip B. sleeping in bed C. sitting by the fireplace D. working around the house	The smallest light has a mirror to A. be used as a lantern B. be used to send messages C. make things look larger D. make it easy to find in the dark
Group 4	
Why did Spider invite Turtle to share his food? A. to amuse himself B. to be kind and helpful C. to have company at dinner D. to appear generous	Paige's love for horses can be compared to Chris's love for A. winning B. practicing hard C. diving D. feeling good
Group 5	
Give two reasons stated in the article why the hearth was the center of the home in colonial times.	Ma said, "I reckon it's time for nooning." What does "nooning" mean? A. making camp for the evening B. yoking up the oxen C. having lunch and resting D. beginning to move along the trail

Group 6—Middle level of cognitive complexity	
By saying that the blue crab's shell is a strong armor, the author suggests that the shell A. contains metal similar to that wonr by King Arthur's knights B. protects the blue crab from attacks by other animals C. has strong muscles like those of professional wrestlers D. consists of a number of heavy plates	This story is A. nonfiction B. a biography C. fiction D. an autobiography
Group 7	
Spider's behavior during the first part of the story is most like that of A. mothers protecting their children B. thieves robbing banks C. runners losing races D. people not sharing their wealth	By reading this advertisement, the reader knows that the designers of this advertisement A. do not like flashlights B. use only one kind of flashlight C. think these flashlights are very useful D. do not know which flashlight to buy
Group 8	
What do Turtle's actions at Spider's house tell you about Turtle?	Which words BEST describe Matthew at the beginning of the story? A. upset and impatient B. cheerful but bored C. anxious and frightened D. puzzled but curious
Group 9	
There is a saying, "Don't get mad, get even." How does this apply to the story?	Imagine that you are going shopping for a flashlight. Which flashlight from the advertisement would you choose? Based on the information from the advertisement, explain why this flashlight is best for you.
Group 10	
Pretend that you are an early American colonist. Describe at least three activities you might do during a cold winter evening. Be specific. Use details from the article to help you write your description.	Coaches agree that certain qualities help athletes to be successful. A. Identify THREE qualities Paige and Chris share that will help them be successful. B. Explain how these qualities will help them.

Group 11—Most complex level of cognitive complexity	
None selected	This story describes the invention of the Franklin Stove. Explain why this story is FICTION. Use information from the story to support your answer.

Elementary teachers then established cutpoints for their item arrays, creating a hierarchy or taxonomy. In order to do this, they had to decide at what point the cognitive demand shifted significantly, requiring a different level of ability from students. Table 7 presents the four categories they created from their original 11 groups, and it also presents descriptors of students' cognitive requirements represented by the items in each category. Performance descriptors were taken from notes written on teachers' hierarchies.

Table 7. Elementary reading hierarchy

First Phase (Original 11 groups)	Second Phase (Four Categories)	Performance Descriptors
Group 1 (Simplest) Group 2	Category A	Skill based, lots of recall, requiring few jumps in knowledge, having everything explicitly stated in story
Group 3 Group 4 Group 5 Group 6	Category B	Limited use of background knowledge, some 'jumps' but they are not broad, no inferring, no generalization, not a broad base of higher level skills
Group 7 Group 8 Group 9	Group C	Good inferring, jumps are much more significant, some analysis, author's purpose (NAEP), much more 'looking into character,' real world, and significant background knowledge helps
Group 10 Group 11 (Most complex)	Group D	Significant inferring, top levels of Bloom's Taxonomy, requires in-depth understanding and makes students pull it all together, and analysis, synthesis, evaluation

Middle school reading. Middle school teachers first sorted all items on poster paper according to cognitive complexity. The left side of the paper indicated the most simple, the right side the most complex. Items that they considered to be equal in complexity were lined up vertically with each other or were placed on top of each other; more complex items were placed to the right, until all items had been placed. When this process was complete, teachers saw five categories of items.

Table 8 presents how items were distributed across the five categories. We see the same pattern as we did in Grade 4 Reading, with more KCCT items falling in the first two categories and NAEP items more evenly distributed. The "bridge" categories represent those items that fell on the dividing line between two adjacent categories.

Table 8. Middle school reading released item distribution by cognitive complexity and origin

	Category 1	Category 2	Bridge	Category 3	Category 4	Bridge	Category 5
KCCT items	9	6	0	5	2	0	3
NAEP items	3	4	1	8	4	1	6

Table 9 presents a sample of released items organized by cognitive complexity and origination. As before, items progress from the simplest to increasingly complex ideas. Again, only illustrative examples are included in the table.

Table 9. Middle school reading sample released items by cognitive complexity and origin

Sample NAEP released items	Sample KCCT released items
Category 1—Simplest level of cognitive complexity	
The Emperor did not rush out to see the flying machine when his servant first told him about it because the Emperor A. was too frail to run B. had just awakened from a dream C. wanted time to think about what it might mean D. was testing the servant's loyalty to him	Which describes the order of the stages in which two glued objects come apart? A. snap, crackle, pop B. crackle, pop, snap C. pop, snap, crackle D. pop, crackle, snap
Category 2	
In the poem "Finding a Lucky Number," Gary Soto contrasts A. dogs and squirrels B. present youth and future aging C. Indian summer and the coming of winter D. eating candy and a healthy diet	In the first stanza, the reader can tell that the sokoya A. is in a happy mood B. is considered wise C. looks older than she really is D. speaks in Athabaskan
Category 3	
The Emperor seems to view the Great Wall as a A. protector of his way of life B. popular tourist attraction C. symbol of the human spirit D. way to prevent people from escaping	Which of the words below is used in a simile in the poem? A. bluebell B. mouth C. heart D. pools

Category 4	
Why does the Emperor ask the inventor twice, "What have you done?'	Describe the difference between "goodbye" and "tlaa" as they are used in this poem.
Category 5	
Some people say that the Anasazi's success as a civilization caused their decline. Using information in the article, explain why you agree or disagree with this statement.	In this excerpt, the author describes Dolley Madison's actions before the British burned Washington, DC. a. Identify two character traits of Mrs. Madison b. Describe the actions that illustrate her character traits Use details from the article to support your answer.

Teachers then created a five-category taxonomy based on Bloom (1956). They designated the categories by drawing lines down the page on which items had been pasted and writing descriptions on the paper. The first category ranged from "basic recall/literal comprehension" at the extreme left to "some rewording/paraphrasing" near the line that separated the first and second categories. The second category was labeled "comprehension;" the third, "inference;" the fourth, "analysis;" and the final category, "evaluation." Table 10 presents the hierarchy.

Table 10. Middle school reading hierarchy

Category 1	Category 2	Category 3	Category 4	Category 5
Basic recall/literal comprehension; some reword-ing/paraphrasing	Comprehension	Inference	Analysis	Evaluation

Elementary mathematics. Teachers initially sorted released test items into nine groups as displayed in Table 11. The proportions of items in each category were similar except for Level 9, which contained only KCCT items.

Table 11. Elementary math released item distribution by cognitive complexity and origin

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Level 9
KCCT	4	2	2	4	5	3	1	3	3
NAEP	2	5	7	9	8	8	8	6	0

Table 12 contains sample released NAEP and KCCT questions arranged by level of complexity. Only illustrative examples are included in the table.

Table 12. Elementary math sample released items by cognitive complexity and origin

Sample released NAEP items	Sample released KCCT items
Level 1—Least complex	

Sample released NAEP items	Sample released KCCT items
What number is four hundred five and three-tenths? A. 45.3 B. 405.3 C. 453 D. 4,005.3	Which number has a 5 in the hundreds place, a 6 in the tens place, and a 3 in the tenths place? A. 0.54630 B. 5.6430 C. 56.34 D. 564.30
Level 2	
What is 18,565 rounded to the nearest thousand? A. 18,000 B. 18,600 C. 19,000 D. 20,000	Which number is BETWEEN 576,023 and 584,277? A. 578,331 B. 575,883 C. 589,377 D. 588,934
Level 3	
N stands for the number of stamps John had. He gave 12 stamps to his sister. Which expression tells how many stamps John has now? A. N + 12 B. N – 12 C. 12 – N D. 12 x N	Anton has saved 37 nickels. What is the total value of the nickels he saved? A. $1.35 B. $1.55 C. $1.85 D. $10.35
Level 4	
There are 3 fifth graders and 2 sixth graders on the swim team. Everyone's name is put in a hat and the captain is chosen by picking one name. What are the chances that the captain will be a fifth grader? A. 1 out of 5 B. 1 out of 3 C. 3 out of 5 D. 2 out of 3	Grandpa gave his collection of 584 pennies to his 8 grandchildren. If each grandchild received the same number of pennies, how many pennies did each child get? Which computation can be used to solve the problem above? A. 584 x 8 B. 584 / 8 C. 584 + 8 D. 584 - 8
Level 5	
If 1 1/3 cups of flour are needed for a batch of cookies, how many cups of flour will be needed for 3 batches?	The table below shows how many miles four students walked during a two-day period.

Sample released NAEP items	Sample released KCCT items
A. 4 1/3 B. 4 C. 3 D. 2 2/3	<table><tr><th></th><th>Mon.</th><th>Tues.</th></tr><tr><td>Violet</td><td>0.6</td><td>1.3</td></tr><tr><td>Rose</td><td>1.1</td><td>0.7</td></tr><tr><td>Chris</td><td>0.8</td><td>1.2</td></tr><tr><td>Jill</td><td>1.2</td><td>0.9</td></tr></table> Which student walked the longest distance? a. Violet b. Rose c. Chris d. Jill
Level 6	
Sam can purchase his lunch at school. Each day he wants to have juice that costs 50 cents, a sandwich that costs 90 cents, and fruit that costs 35 cents. His mother has only $1.00 bills. What is the least number of $1.00 bills that his mother should give him so he will have enough money to buy lunch for 5 days?	Corina was investigating information about natural wonders of the world. She found that Mt. Everest is the highest mountain in the world. It is 29,028 feet ABOVE sea level. She found that the Marianas Trench in the Pacific Ocean is the lowest point on Earth. It is 35,840 feet BELOW sea level. a. If Corina could throw a rock from the top of Mt. Everest to the bottom of the Marianas Trench, how many feet would it fall? b. Draw a diagram and explain your answer for **part a**.

Level 7

Puppy's Age	Puppy's Weight
1 month	10 lbs
2 months	15 lbs
3 months	19 lbs
4 months	22 lbs
5 months	?

John records the weight of his puppy every month in a chart like the one above. If the pattern of the puppy's weight gain continues, how many pounds will the puppy weigh at 5 months?

B. 30
C. 27
C. 25
D. 24

Bob got a higher grade than Michael on an English test. Glen's grade was higher than Bob's. Paul's grade was higher than Glen's. If you ranked these students by their test grades, from the highest to lowest, who would be in third place?

A. Bob
B. Michael
C. Paul
D. Glen

Level 8

Think carefully about the following question. Write a complete answer. You may use drawings, words, and numbers to explain your answer. Be sure to show all of your work.

The gum ball machine has 100 gum balls; 20 are yellow, 30 are blue, and 50 are red. The gum balls are well mixed inside the machine.

Jenny gets 10 gum balls from this machine.

What is your best predictions of the number that will be red?

Answer: _____ gum balls

Explain why you chose this number.

David put these cards into a box.

4, 8, 7, 4, 3, 2, 8

If he draws one card out of the box without looking, the number on the card will MOST LIKELY be

A. an even number.
B. an odd number.
C. a number greater than 4.
D. a number less than 4.

Level 9	
N/A	Jose created a game using two number cubes of different colors. The green cube had ODD multiples of 3 and the red cube had EVEN multiples of 3. A. What was the color of the cube that had the number 6? B. List SIX numbers that could be on the OTHER cube. C. Could Jose design the same game using multiples of 4? Explain your answer.

Elementary mathematics teachers created their hierarchy in two phases. In the first phase they split the items into three categories: 1) basic recall/understanding, 2) application/ conceptualization, and 3) analysis/evaluation. They divided the items in each of those categories into three groups by ordering the items in terms of their cognitive complexity. Table 13 presents the hierarchy.

Table 13. Elementary math hierarchy

	Phase 1	Phase 2	Descriptors
1.	Basic Recall/ Understanding	*Knowledge/Recall*	Students are strictly asked to identify and recognize.
2.		*Comprehension/Understanding*	Students are required to show an understanding above recall, but not required to apply.
3.		*Upper Level Comprehension with Simple Applications*	These questions require students to show an understanding of basic knowledge, and begin to apply that knowledge at a very simple level.
4.	Application/ Conceptualization	*Basic Application of a Higher Level of Understanding*	Students are required to demonstrate/show knowledge.
5.		*More Advanced Application*	Students are required to compute, apply knowledge of operations, perform multi-step problems, and/or examine a concept.
6.		*Upper Level Application with Simple Analysis or Synthesis*	Students are required to demonstrate, construct, create, and analyze at a very simple level.
7.	Analysis/ Evaluation	*Basic Analysis of Concepts/Skills*	Students are required to compare/contrast attributes, use deductive reasoning, make generalizations or identify rules based on data.
8.		*More Advanced Analysis*	Students are required to formulate rules, justify, and/or critique (sometimes including evaluation at a simple level. These may involve recognizing relationships and making

		connections.
9.	*Complex Analysis Involving Evaluation*	Students are required to formulate rules, justify, and/or critique with evaluation at a more advanced level. These involve recognizing relationships and making connections.

Middle school mathematics. Teachers sorted KCCT and NAEP released test items from lowest to highest, and then established cutpoints, resulting in five levels. Table 14 displays the distribution of items by level. Teachers discussed placement of test items in their relative positions by explaining how one item was more cognitively complex than the other item.

Table 14. Middle school math released item distribution by cognitive complexity and origin

	Level 1	Level 2	Level 3	Level 4	Level 5
KCCT items	7	8	7	1	6
NAEP items	18	19	7	7	1

Table 15 presents a sample of released test items from NAEP and KCCT arranged by level of complexity from least to most complex.

Table 15. Middle school math sample released items by cognitive complexity and origin

Sample NAEP released items	Sample KCCT released items
Level 1—Least complex	
Of the following, which is the best unit to use when measuring the growth of a plant every other day during a two-week period? a. Centimeter b. Meter c. Kilometer d. Foot e. Yard	Mary correctly used the order of operations to answer the following problem: $20 - 8 \bullet 4 \div 2 + 6$ What is Mary's answer? a. 0 b. 6 c. 10 d. 30
Level 2	
A poll is being taken at Baker Junior High School to determine whether to change the school mascot. Which of the following would be the best place to find a sample of students to interview that would be most representative of the entire student body? a. An algebra class b. The cafeteria c. The guidance office d. A French class e. The faculty room	A shirt is on sale for 25% off the original price, p. Which equation could you use to figure out the sale price, s, of the shirt? a. $p = s + 25$ b. $s = p - .25$ c. $p = s + .25s$ d. $s = p - .25\ p$

Sample NAEP released items	Sample KCCT released items
Level 3	
From a shipment of 500 batteries, a sample of 25 was selected at random and tested. If 2 batteries in the sample were found to be dead, how many dead batteries would be expected in the entire shipment? a. 10 b. 20 c. 30 d. 40 e. 50	Jason is planning to go to a concert. He has $25.00. A ticket costs $11.75. Which inequality represents the amount of money Jason can spend on refreshments? a. $x + 11.75 \leq 25$ b. $x - 11.75 \leq 25$ c. $x + 11.75 \geq 25$ d. $x - 11.75 \geq 25$
Level 4	
A plumber charges customers $48 for each hour worked plus an additional $9 for travel. If *h* represents the number of hours worked, which of the following expressions could be used to calculate the plumber's total charge in dollars? a. $48 + 9 \div h$ *b.* $48 \times 9 \times h$ c. $48 \div (9 \times h)$ d. $(48 \times 9) + h$ e. $(48 \times h) + 9$	Use the table below to answer the question. X 1 2 3 4 Y 1 4 ? 10 Study the pattern in the table above. What is the missing value of y? a. 6 b. 7 c. 8 d. 9

Level 5—Most complex

1980 Population 1990 Population

Town A●●●●● Town A●●●●●●●●
Town B●●●●●● Town B●●●●●●●●●

● = 1,000 people

In 1980, the populations of Town A and Town B were 5,000 and 6,000, respectively. The 1990 populations of Town A and Town B were 8,000 and 9,000, respectively.

Brian claims that from 1980 to 1990 the populations of the two towns grew by the same amount. Use mathematics to explain how Brian might have justified his claim.

Darlene claims that from 1980 to 1990 the population of Town A had grown more. Use mathematics to explain how Darlene might have justified her claim.

The women's 200-meter backstroke is one event of the summer Olympics, which are held every four years. The table below shows the winning times (in minutes and seconds) of the event since 1968.

a. Graph the numeric data from the table on the grid provided in your Student Response Booklet.
b. Describe the trend that is displayed by the graph.
c. Based on the data and your graph, predict a reasonable winning time for the women's 200-meter backstroke in the year 2000. Explain your reasoning.

Olympic 200-Meter Backstroke

Year	Time	Country
1968	2:24	United States
1972	2:19	United States
1976	2:13	E. Germany
1980	2:11	E. Germany
1984	2:12	Netherlands
1988	2:09	Hungary
1992	2:07	Hungary
1996	2:08	Hungary

The teachers then developed a description for each level. Descriptions for each of the five levels are shown in Table 16.

Table 16. Middle school math hierarchy

Level	Descriptors
1.	Single concept; simple concept; reinforced concept (concept previously learned concrete concept; basic thinking; minimal work (or no work) required; Terms-knowledge, memory, definition, recall
2.	1-2 concepts, if 2 concepts both are simple; newly learned concepts; concrete concepts; simple thinking; some work may be required; utilizes previously learned concepts; moving to basic reasoning (from rote learning); single step process; Terms-estimate, compare, simple equation solving, translating words to symbols
3.	Concrete concepts; usually 2 simple concepts; utilizes previously learned concepts; some simple application of concepts; moderate thinking; increasing application of reasoning skills; some multi-step process; Terms-relate, conversion, solving multi-step equations
4.	Single abstract concept; single explanation; continuation of the increased use of applications in-context; advanced thinking; more in-depth reasoning; must include an explanation in response; Terms-analysis, formal reasoning, logic
5.	Multiple concepts; complex concepts-abstract thinking; multi-task, multiple-step problems; more than 1 strategy may be utilized in solving problem; complex thinking; deciphering of a small passage is often required before solving the problem; Terms-judge, support, evaluate, synthesize

Item format

Task Five—Comparing Item Types

Reading. Elementary teachers examined items to determine if there were major differences between KCCT and NAEP item formats. As they did so, they described guidelines they used when writing items for KCCT: to avoid the use of the word "not" in questions, to write questions that must be answered by reading the passage rather than simply drawing from background knowledge, and to introduce the reading passage with a paragraph that leads the student into the selection. In addition, they specify graphic elements such as boldface type, italics, or pictures that they want to accompany the items.

When writing KCCT items, teachers are also instructed to ensure that the words they use in questions are on the appropriate grade level and to use specific, descriptive verbs such as "explain" or "describe" (known as "power verbs" in Kentucky) rather than a more general term such as "tell about." Teachers said that NAEP often uses more general terms in its questions instead of the more specific language used on KCCT.

One of the major differences between item formats on the tests is the type of question to which students respond. KCCT has two types, multiple choice and open response. NAEP has three: multiple choice, short constructed response requiring an answer of one or two sentences, and extended constructed response requiring a lengthier answer. Initially, teachers were confused over the apparent differences in NAEP constructed response items, but they eventually

discovered that short constructed responses are worth 3 points, while the extended constructed responses are worth 4 points.

Elementary teachers seemed to prefer the way Kentucky's open-response questions are worded. They note that Kentucky encourages the use of scaffolded questions that allow students to answer at least a portion of the question; they said that NAEP questions were not written with scaffolding in mind. In addition, teachers thought that Kentucky's questions did a better job of focusing students on questions. As an example, they cited a NAEP question that asked students to "write a paragraph telling the major things you learned about blue crabs." The teachers said that they would rewrite the question, asking students to "List four major things you learned about blue crabs." They also would have reworded a NAEP question that asks, "Who do you think would make a better friend, Spider or Turtle? Explain why." Instead, they would ask students "Who do you think would make a better friend, Spider or Turtle? Give three examples from the story and use details from the story to support your answer." In addition, they noted that NAEP uses a general rubric when grading student responses, while KCCT uses a specific rubric designed for a particular question. (Teachers had the NAEP general rubric at hand, and they assumed that NAEP items were scored using the general rubric. NAEP scoring is actually item-specific in much the same way as KCCT.)

Middle school reading teachers also examined open-response and multiple-choice questions for differences in formatting. They had several comments about differences in the way constructed-response questions were constructed and presented in each format. For example, they questioned NAEP's tendency to ask students what they think when answering a question. Teachers said they believe this format provides an easy way out for students to provide an incomplete answer; one that students would be able to justify by saying, "Well, that's what I think." Teachers were also concerned about the ability to grade such a question accurately. They thought the rubric for such a question would be very difficult to develop.

Middle school teachers also stated that NAEP asks questions that call upon student background or experiences. They said that they are instructed to avoid this type of question since it is not fair to all students if they have not had a similar experience.

They also said that NAEP encourages very short answers or even "yes" and "no" answers. These teachers said they believed NAEP did not encourage additional thought to show depth of knowledge. Teachers were concerned that lower ability students, in particular, would not provide as complete an answer with such a question format.

Middle school teachers also discussed several constructed-response formatting concerns that might have an impact on scoring differences between KCCT and NAEP:

- When KCCT uses the word "identify," it is always followed by a second part requiring students to describe or explain the answer.

- NAEP uses a one- or two-sentence question format, whereas KCCT uses an A, B, C format to designate steps for completely answering the question. Teachers stated that this format is clearer and helps students remember to do all the steps. At one time,

teachers said Kentucky used the one- or two-sentence format as well, but they found that students omitted steps if they were not clearly labeled.

- KCCT uses boldface type to highlight important words.

- KCCT consistently uses the same word, such as "passage" or "poem," when referring to the reading selection, while NAEP often uses a variety of terms such as "story," "text," or "article," within a question set to refer to the same passage.

- NAEP questions vary in design and wording, making it seem as if NAEP is trying to test a student's test-taking skills.

- NAEP uses language that teachers felt was not specific enough. NAEP asks students to "tell about" something, while KCCT asks students to "explain," "describe," or "identify."

Middle school reading teachers found fewer differences between multiple-choice questions in the two tests, compared to constructed-response questions. For example, teachers found similarities in question length and descriptors, the use of parallel construction, and construction of answer choices. For example, if a question is set up for a noun answer, then all choices are nouns. The major difference in the multiple-choice component is that KCCT items can test students on reading skills, such as the use of antonyms, synonyms, and homonyms, while the sole purpose of NAEP is to test reading comprehension. Reading strategies such as finding a detail or summarizing are not reported on NAEP because it is not designed as a student-level diagnostic test but rather as a test of overall achievement (p. 5, Reading Framework for the 2003 National Assessment of Educational Progress; www.nagb.org/pubs/read_fw_03.pdf)

Mathematics. Elementary math teachers found that the language used on KCCT and NAEP multiple-choice items was very similar, with two exceptions. First, KCCT uses a great deal more mathematics vocabulary than NAEP does. For instance, a KCCT geometry item referred to a figure's "vertex." A very similar NAEP item used the term "corner." Teachers found several similar examples among the released items. KCCT also tends to include units of measure, even when the item is not necessarily asking for units, in the answer selections. NAEP might ask "how many centimeters" and have a selection of numbers from which students choose. KCCT would more likely ask "how long" and selections might include the same number with different units as well as different numbers from which to choose.

Open/constructed-response items were different in that KCCT does not include "short constructed response" items. KCCT only has open-response, which are similar to NAEP's extended-response items, and multiple-choice items. The major language difference between NAEP and KCCT for written-response items is that KCCT items are scaffolded in order to allow lower-ability students to access the items. KCCT items tended to have parts that ranged from easier to more difficult in order to allow all students to respond in some meaningful way to the items. NAEP items tended not to be constructed in this manner. They rarely had distinct parts.

Finally, KCCT open-response items tended to use vocabulary not used on NAEP. Teachers found the same differences for mathematics vocabulary as on multiple-choice items.

KCCT expected more mathematics vocabulary than NAEP. However, the teachers also discovered that vocabulary used to focus the students' responses was more prevalent on KCCT items. Where a KCCT item might ask students to "compare, contrast, explain, argue, or disprove," NAEP would simply use the phrase "tell about."

Middle school teachers discussed multiple-choice questions on the assessments and noted that both used graphics in the questions. The readability and grade level of the questions were appropriate. Additionally, both assessments had what the teachers considered appropriate distractors.

These teachers did note some differences on the multiple-choice questions between the two assessments. They believed that NAEP has a greater emphasis on basic computation compared to KCCT. The teachers also considered some questions as having a lower contextual interest on NAEP, while KCCT seemed to have more real-life situations. Teachers commented that KCCT questions used more precise mathematical terms than did NAEP. The teachers also said that when they wrote questions for KCCT, they were instructed to use mathematical terms. On KCCT, each multiple-choice item has four response options, while there were five response options on NAEP. Additionally, KCCT uses bold print and/or underlines to highlight or emphasize words or phrases while NAEP does not use bold print or underlining. The teachers also noted that NAEP assesses scientific notation in the mathematics assessment. Scientific notation was removed from the KCCT mathematics assessment several years ago.

Table 17 summarizes the similarities and differences teachers noted between the multiple-choice items from the two tests.

Table 17. Comparisons between middle school mathematics multiple-choice items on KCCT and NAEP

Similarities	Differences
• Use graphics • Grade level appropriate • Readability level • Appropriate distractors	• NAEP includes more basic computation • KCCT has only 4 response options-NAEP sometimes has 5 • KCCT uses bold print and/or underlines • NAEP uses more manipulatives • NAEP has low-interest contextual situations-KCCT more real-life • KCCT uses more precise mathematical vocabulary • NAEP assesses scientific notation

Middle school teachers next commented about the positive points of each test's open-ended questions, such as being multi-step, very readable, having good graphics, and being grade-level appropriate. The teachers considered that questions from each test had approximately the same degree of complexity. However, the teachers did note some differences between the tests' open-ended questions. The teachers said that in developing questions, Kentucky teachers were guided to have scaffolded questions to ensure all or most students would be able to at least get

started and answer a portion of the question. The teachers also stated that the KCCT open-response questions tended to use more engaging, real-world situations. They noted that there were a couple of NAEP questions that required students to use manipulatives supplied with the test. Table 18 summarizes teachers' comments about the similarities and differences between the tests.

Table 18. Comparisons between middle school mathematics open-response items on KCCT and NAEP

Similarities	Differences
• Utilize multi-step questions • Readability • Degree of complexity • Graphics • Grade level appropriate	• NAEP responses are written on lined paper-KCCT responses on grid paper • KCCT scaffolds questions to insure low-entry • KCCT uses engaging, real-world situations • NAEP uses questions that require students to produce a product using manipulatives (e.g., use the shapes to produce an image)

When reviewing the items, teachers noted some similarities and differences about the approach taken in conducting the assessments in general. They noted that both tests used standards that were similar to the NCTM (National Council of Teachers of Mathematics) standards.

Both assessments used multiple forms so that a more complete assessment of the content could be conducted without overburdening any one student. However, since NAEP sampled the content more broadly, NAEP did not report individual student scores. The teachers noted that NAEP tested only a sample of the students in the state and even at each school. As a result, NAEP could only report on the progress of states and large districts.

The teachers also noted some distinct differences in the formatting of the standards and the test items. For the standards, NAEP divided the content into five strands while the Kentucky standards only had four content strands. NAEP consisted of timed tests, while KCCT was not as restrictive on student use of time. While taking the KCCT, students were allowed unlimited calculator usage. Students were allowed to use a calculator only on certain parts or on specific forms when taking NAEP.

Teachers noted that because the number of items covering each content strand differed between NAEP and KCCT, the result was the content strands were weighted differently on the two assessments. The teachers noted specifically that on NAEP questions on the Algebra strand were weighted at approximately 25% of the assessment, while on KCCT the Algebra strand was approximately 15% of the 8^{th} grade math score.

Table 19. General comments comparing middle school mathematics KCCT and NAEP tests

Similarities	Differences
• Multiple forms • Frameworks similar to NCTM standards	• NAEP uses 5 content strands-KCCT 4 • NAEP is timed test • Achievement levels • KCCT allows unlimited calculator use-NAEP limits use • NAEP is given earlier in the school year and to a smaller sample of students • NAEP does not give individual scores • Percentages within strands are different-(e.g., on NAEP Algebra is 25%, KCCT Algebra is 15%) • Components of framework weighted differently

Task Six—Examining Reading Passages

As noted previously, only elementary and middle school reading teachers completed this last workshop task, since the mathematics tests do not contain reading passages. Elementary teachers examined reading passages for differences and similarities. Perhaps the most important difference in reading passages between the two systems is the fact that NAEP uses selections with reading levels ranging from 2nd through 8th grades in its 4th grade test; according to teachers, the grade-level range for KCCT is smaller. This large reading level range on the NAEP reading test is necessary to ensure that most students in the national sample will find something that they are able to read. Teachers judged passage length as similar, with NAEP passages ranging from 250-800 words and Kentucky passages containing no more than 750 words.

Middle school teachers noted strong differences between NAEP and KCCT reading passages:

- Teachers noticed that KCCT, with six reading passages, had more variety than did NAEP, with only three passages. However, we note that the NAEP released items used in the workshop may not have constituted a complete form.

- Teachers were surprised that one NAEP reading selection dealt with the topic of execution. This would not have been permitted under the strict guidelines of Kentucky's bias committee, which screens passages and questions for topics it considers inappropriate, such as violence or racial stereotyping.

- Teachers also noticed that NAEP mixes different types of reading into one passage, such as an article that included a poetry selection. The accompanying question set asked students about both the article and poem. The teachers said that KCCT would include one or the other, not both, in a single passage and question set.

- NAEP readability appeared to be more difficult, although teachers admitted it was difficult to pinpoint exactly why they felt this way. KCCT assesses reading at the seventh grade and NAEP at the eighth grade, which may contribute to this perception.

- KCCT used a formula to apportion reading passage type (literary, informational, persuasive, or practical/workplace) on the test. It was unclear whether NAEP used a similar system. In addition, teachers said that each KCCT reading form contained a good balance of all types of reading.

- Teachers felt that KCCT more appropriately fit the readings to student environments, although they said they do recognize that NAEP is a national assessment that has to reach a broader range of students. Since NAEP tests only a sample of students and does not assign student-level scores, teachers considered it to be a more general test. KCCT, on the other hand, does assign student-level scores; therefore, the readings must be able to draw out more specific aspects of an individual student's performance.

- KCCT tried to balance readings to be appropriate for a variety of readers, such as male/female. The teachers were unable to determine if NAEP did, too, but noted that it is important to do so.

- The teachers described the length of reading passages in the two tests as somewhat comparable. They noted that KCCT purposefully counters a long reading passage with a couple of shorter passages.

Item content

After the CAC teachers created the links and determined the degree of match between KCCT and NAEP framework standards, HumRRO researchers applied their work to KCCT operational items. This was done after the workshops were completed. Researchers first examined Kentucky's item documentation, which lists each item and information such as the form on which it appears, its status (field test or operational), and the KCCT content standard it addresses[2]. Using the item documentation, researchers tallied the number of times each content standard appeared only as a primary content standard for an operational item. Then they used the charts created by workshop participants to determine the NAEP content standard linked to that particular KCCT content standard and the degree of match ("exact," "close/unsure/partial," or "no match") between the two. They repeated the above process using secondary and tertiary content standards. The final step was creating bar graphs to display their findings. These graphs summarize the distribution of KCCT operational items among KCCT content standards and the

[2] When an item is written, item writers determine which KCCT content standard the item best addresses. This becomes the item's primary content standard. In some cases, item writers believe that an item addresses several standards. These items can have a secondary content standard, or even a secondary and tertiary content standard, in addition to their primary content standard. All items will have a primary content standard, but not all items will have a secondary or tertiary content standard.

degree of match between NAEP and KCCT content standards. Note that this analysis includes content statements[3] while previous analyses (Hoffman & Bacci, 2003) stopped at subdomain.

Using Figure 1 (which follows) as an example, note that KCCT content standards, indicated by a three-number code such as 1.0.001, form the x-axis of the graph. These three-number codes correspond to those used in the Core Content for Assessment (www.Kentuckyschools.net/KDE/Instructional+Resources/Curriculum+Documents+Resources/Core+Content+for+Assessment.htm). The number of KCCT operational items using that particular content standard comprises the y-axis. In most cases, two columns appear side by side over a single KCCT content standard; the left-hand column represents the number of times that KCCT content standard was used only as a primary content standard and the right-hand column the number of times the standard was used as a primary, secondary, or tertiary content standard. Thus, in Figure 1 (Grade 4 Reading—Literature), we see that KCCT content standard 1.0.001 was used 5 times as a primary content standard and 10 times as either a primary, secondary or tertiary standard. In some cases, however, a standard has only a single column above it, as in the case of KCCT content standard 1.0.005 (Figure 1). This occurs when that standard is not used as a primary standard but is used as a secondary or tertiary standard. Therefore, single columns will always represent secondary or tertiary standards, never primary standards. To avoid any confusion, Table 20 presents those standards that are used only as secondary or tertiary standards.

Table 20. KCCT content standards (by grade and subject) used only as secondary or tertiary content standards

Grade 4 Reading	Grade 7 Reading	Grade 5 Math	Grade 8 Math
1.0.005	2.0.003	1.1.002	1.1.001
2.0.007	2.0.010	1.2.001	3.1.002
3.0.006	4.0.010	2.2.004	3.2.004
		3.2.002	3.3.004
		4.1.001	4.2.004
		4.1.002	
		4.2.005	

Note also that columns in the graphs are shaded differently to represent differences in the degree of match between NAEP and KCCT content standards. We have used black to indicate exact match between NAEP and KCCT content standards, gray to indicate close/unsure/partial matches, and white to indicate no match between standards. Figure 1 shows that KCCT content standards 1.0.001, 1.0.003, 1.0.006, 1.0.008, and 1.0.009 are exact matches with at least some NAEP content standards, while KCCT content standards 1.0.007 and 1.0.010 are classified as close/unsure/partial matches. KCCT content standards 1.0.002, 1.0.004, and 1.0.005, on the other hand, have no matches with NAEP content standards.

[3] Kentucky uses a three-number coding system, such as 1.0.001, to identify content standards. Using elementary reading standard 1.0.001 as an example, the first number represents the subdomain, which in this case is literature. The second number, a 0, is a placeholder in reading. The third number, 001, identifies the particular content statement. Math differs slightly from reading, as it uses a 1, 2, 0r 3 as the second number to identify concepts, skills, or relationships, respectively. The first and third numbers represents subdomain and content statement, as in reading.

Figure 2 (Grade 4 Reading—Informational) shows yet another variation. Note that three KCCT content standards (2.0.002, 2.0.004, and 2.0.005) have no columns above them. This indicates that these standards were not tested, since no operational items bearing these standards as either primary, secondary, or tertiary appeared on the KCCT Reading test. A note below the figure indicates how well the untested standards would have matched NAEP standards. The note shows that workshop participants classified these three KCCT content standards as "no matches" to any NAEP standards. We will examine the issue of unrepresented KCCT content standards in greater detail following the graphs.

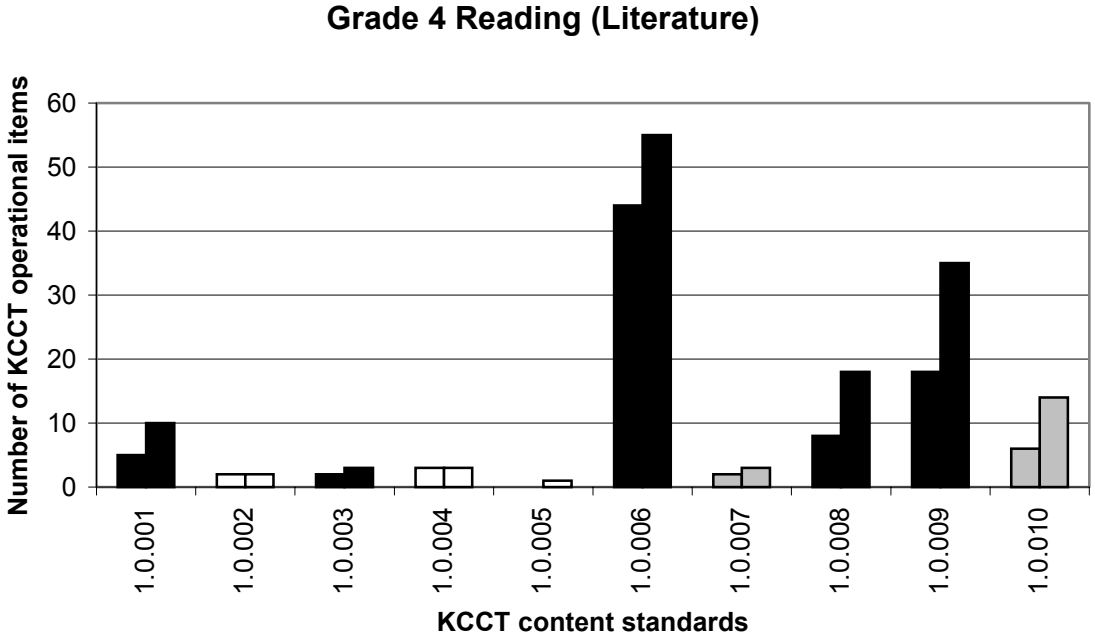


Figure 1. Grade 4 Reading (Literature)--distribution of KCCT operational items by content standard designation (primary vs. primary, secondary, and tertiary) and by degree of match to NAEP content standards

Black bars indicate exact matches between KCCT and NAEP content standards; white, no matches; and gray, partial/close/unsure matches.

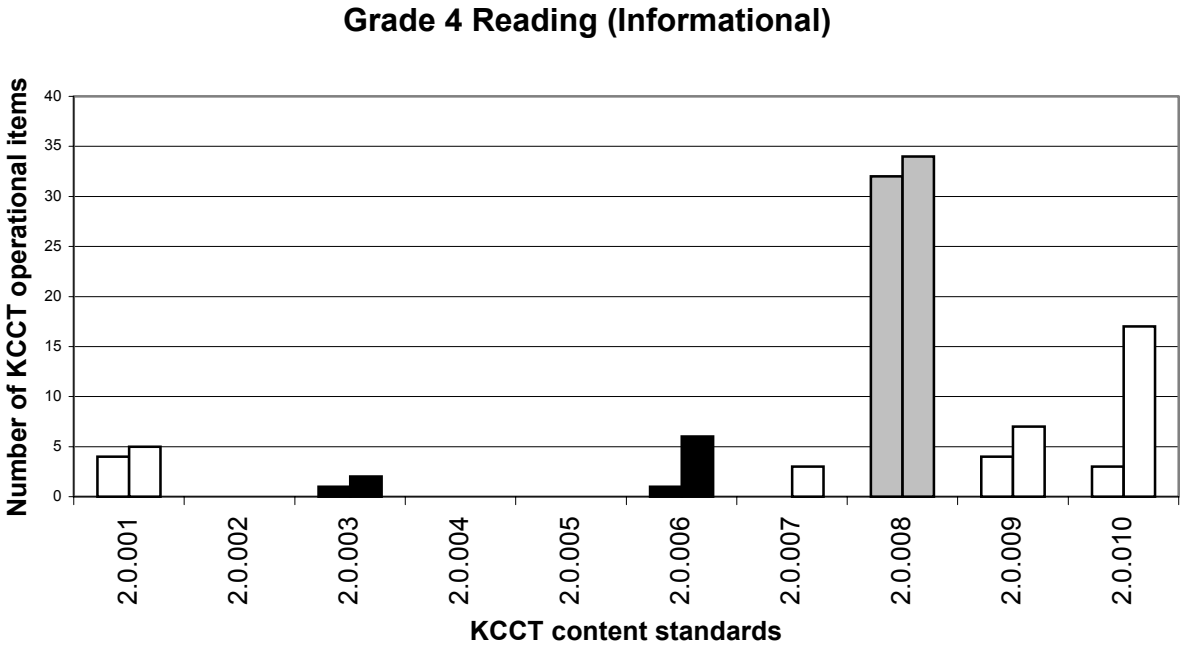


Figure 2. Grade 4 Reading (Informational)--distribution of KCCT operational items by content standard designation (primary vs. primary, secondary, and tertiary) and by degree of match to NAEP content standards

Standards not represented by KCCT operational items:

2.0.002—no match to NAEP content standard(s)
2.0.004—no match to NAEP content standard(s)
2.0.005—no match to NAEP content standard(s)

Black bars indicate exact matches between KCCT and NAEP content standards; white, no matches; and gray, partial/close/unsure matches.

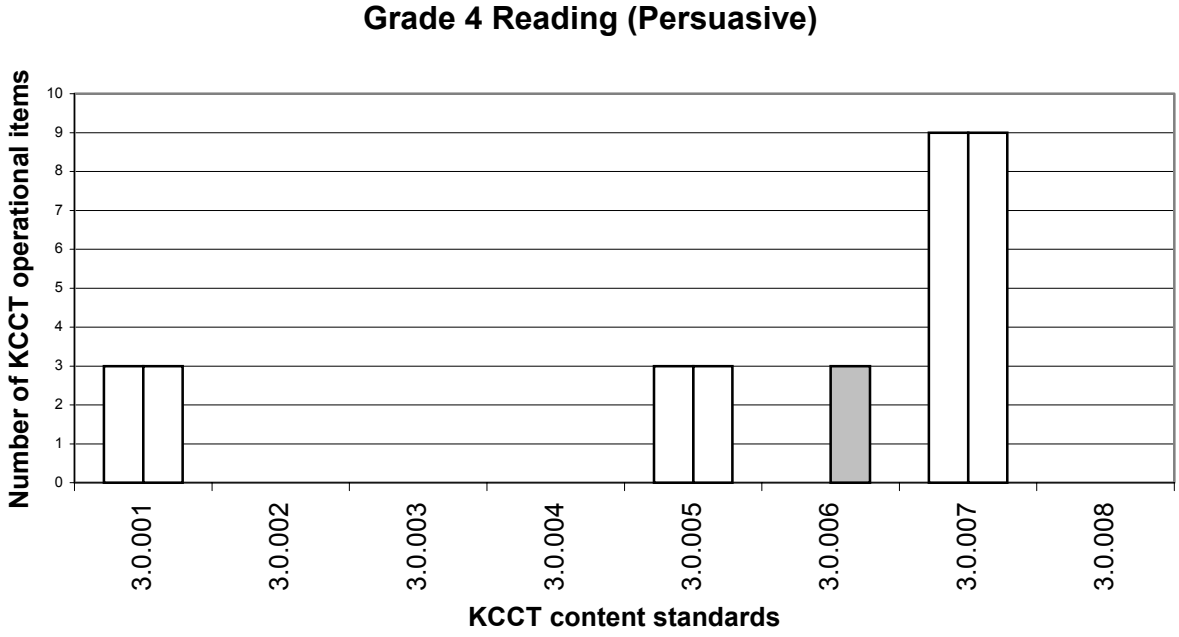


Figure 3. Grade 4 Reading (Persuasive)--distribution of KCCT operational items by content standard designation (primary vs. primary, secondary, and tertiary) and by degree of match to NAEP content standards

Standards not represented by KCCT operational items:

3.0.002—no match to NAEP content standard(s)
3.0.003—exact match to NAEP content standard(s)
3.0.004—no match to NAEP content standard(s)
3.0.008—no match to NAEP content standard(s)

Black bars indicate exact matches between KCCT and NAEP content standards; white, no matches; and gray, partial/close/unsure matches.

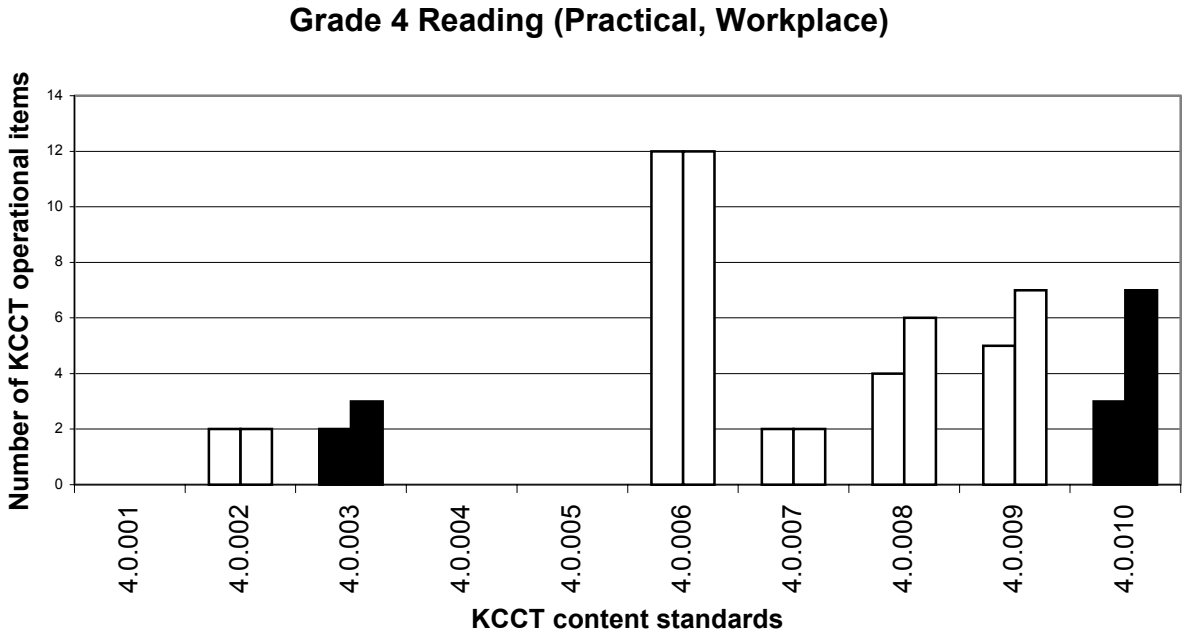


Figure 4. Grade 4 Reading (Practical, Workplace)--distribution of KCCT operational items by content standard designation (primary vs. primary, secondary, and tertiary) and by degree of match to NAEP content standards

Standards not represented by KCCT operational items:

4.0.001—no match to NAEP content standard(s)
4.0.004—no match to NAEP content standard(s)
4.0.005—no match to NAEP content standard(s)

Black bars indicate exact matches between KCCT and NAEP content standards; white, no matches; and gray, partial/close/unsure matches.

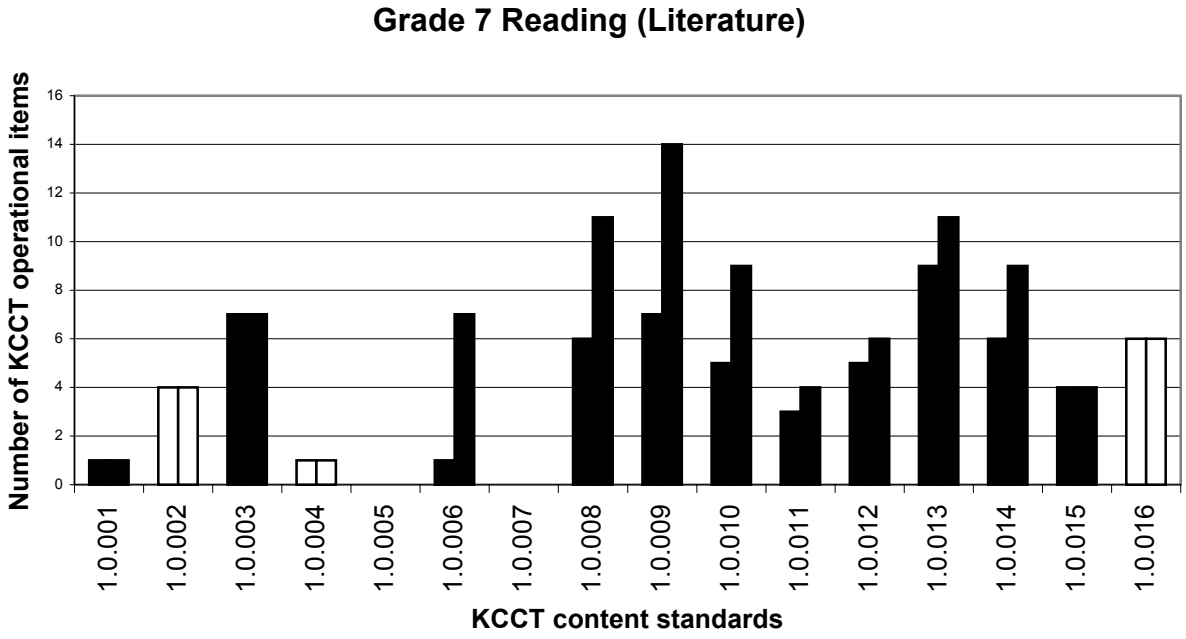


Figure 5. Grade 7 Reading (Literature)--distribution of KCCT operational items by content standard designation (primary vs. primary, secondary, and tertiary) and by degree of match to NAEP content standards

Standards not represented by KCCT operational items:

1.0.005—no match to NAEP content standard(s)
1.0.007—exact match to NAEP content standard(s)

Black bars indicate exact matches between KCCT and NAEP content standards; white, no matches; and gray, partial/close/unsure matches.

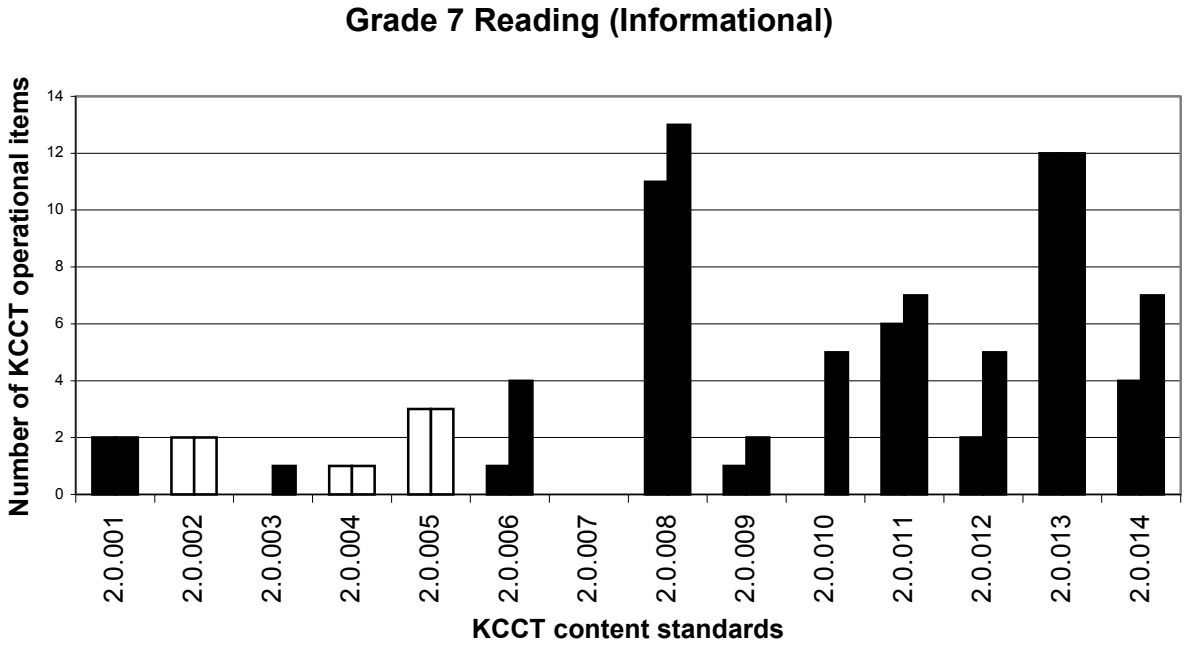


Figure 6. Grade 7 Reading (Informational)--distribution of KCCT operational items by content standard designation (primary vs. primary, secondary, and tertiary) and by degree of match to NAEP standards

Standards not represented by KCCT operational items:

2.0.007—exact match to NAEP content standard(s)

Black bars indicate exact matches between KCCT and NAEP content standards; white, no matches; and gray, partial/close/unsure matches.

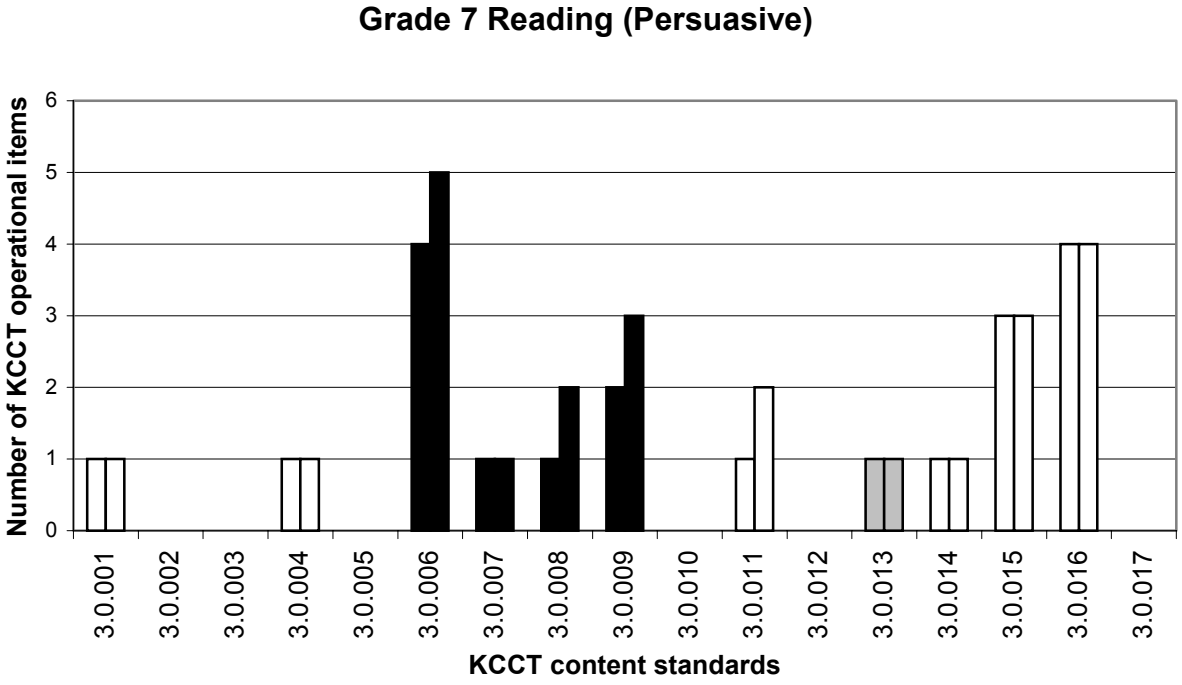


Figure 7. Grade 7 Reading (Persuasive)--distribution of KCCT operational items by content standard designation (primary vs. primary, secondary, and tertiary) and by degree of match to NAEP content standards

Standards not represented by KCCT operational items:

3.0.002—no match to NAEP content standard(s)
3.0.003—exact match to NAEP content standard(s)
3.0.005—no match to NAEP content standard(s)
3.0.010—partial/close/unsure match to NAEP content standard(s)
3.0.012—partial/close/unsure match to NAEP content standard(s)

Black bars indicate exact matches between KCCT and NAEP content standards; white, no matches; and gray, partial/close/unsure matches.

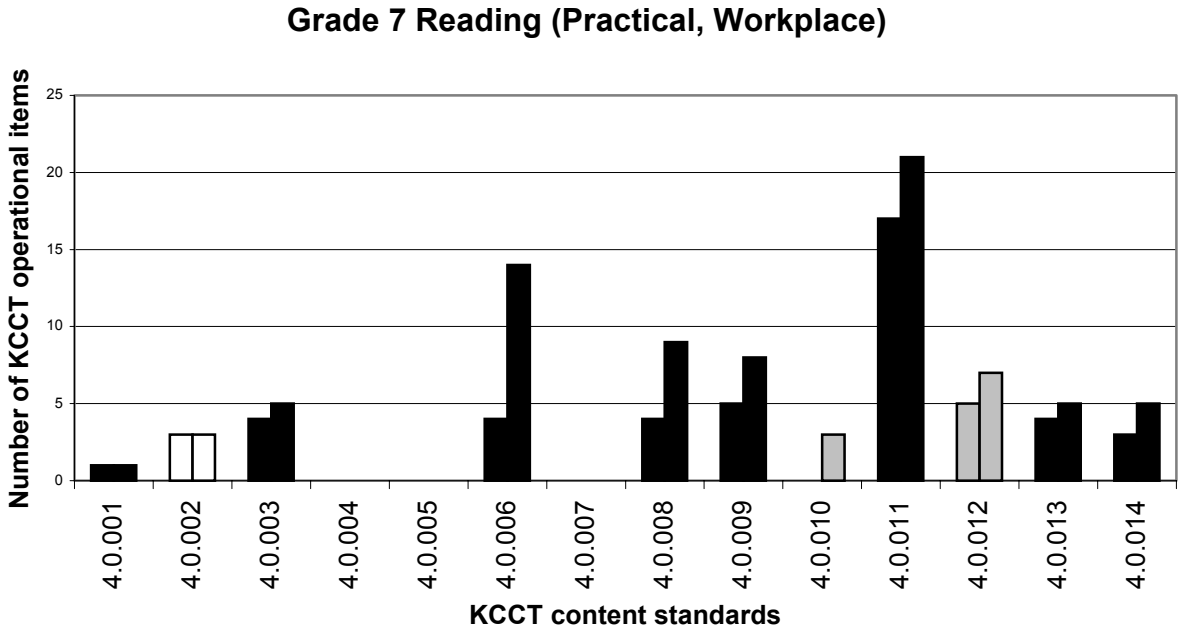


Figure 8. Grade 7 Reading (Practical, Workplace)--distribution of KCCT operational items by content standard designation (primary vs. primary, secondary, and tertiary) and by degree of match to NAEP content standards

Standards not represented by KCCT operational items:

4.0.004—no match to NAEP content standard(s)
4.0.005—no match to NAEP content standard(s)
4.0.007—exact match to NAEP content standard(s)

Black bars indicate exact matches between KCCT and NAEP content standards; white, no matches; and gray, partial/close/unsure matches.

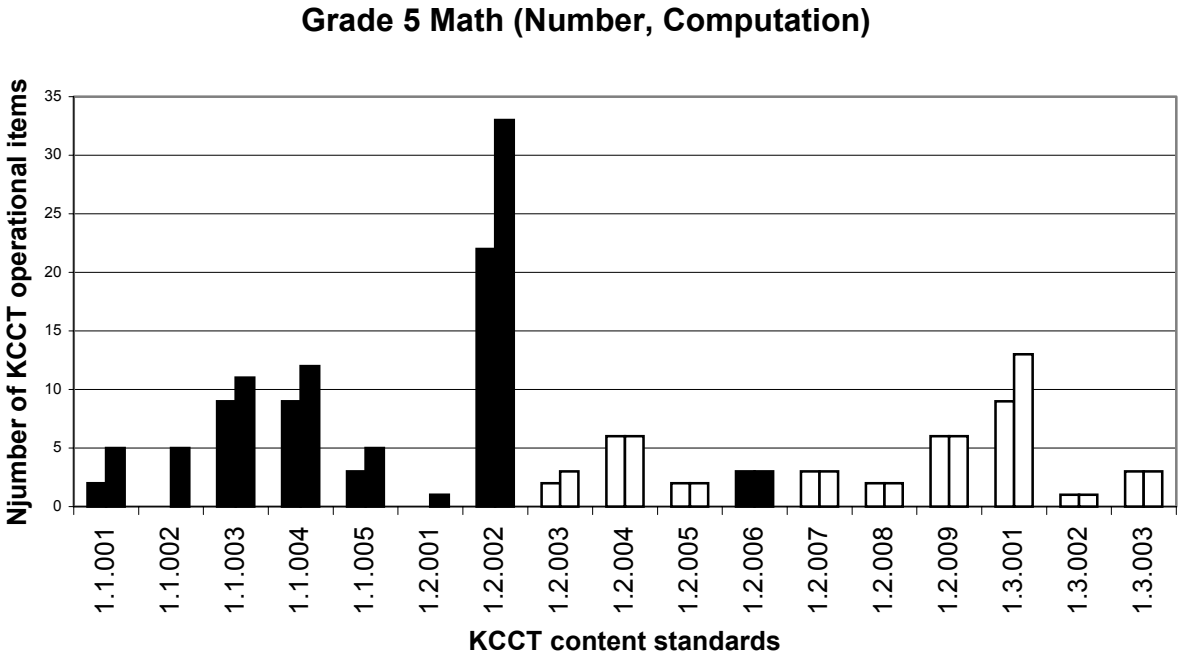


Figure 9. Grade 5 Math (Number, Computation)--distribution of KCCT operational items by content standard designation (primary vs. primary, secondary, and tertiary) and by degree of match to NAEP content standards

Black bars indicate exact matches between KCCT and NAEP content standards; white, no matches; and gray, partial/close/unsure matches.

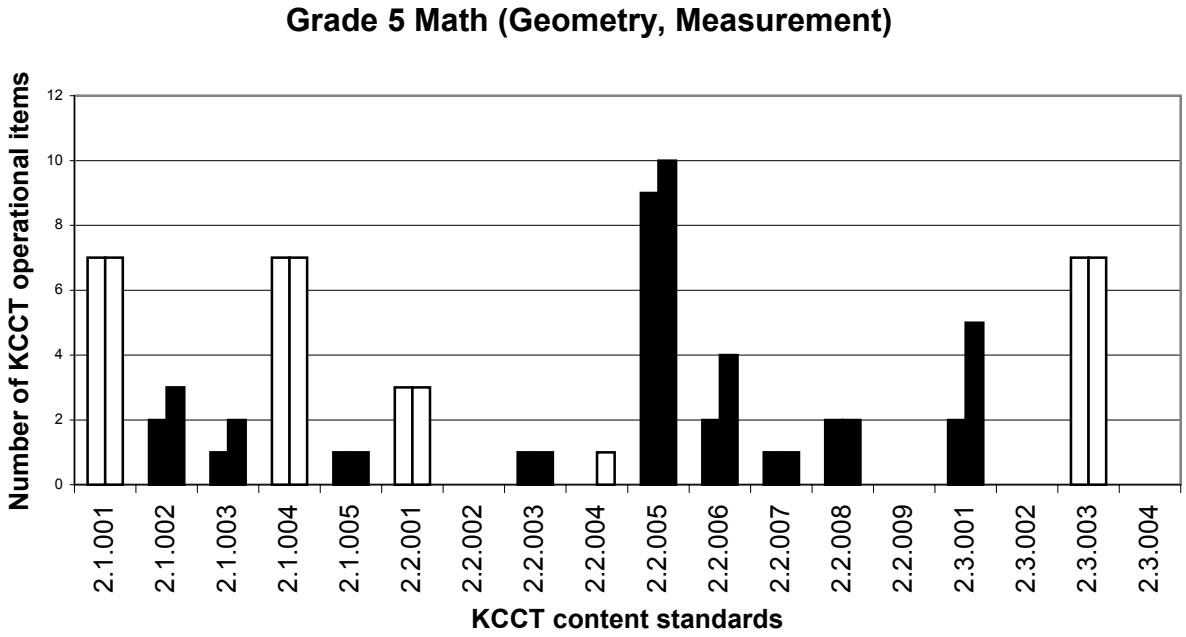


Figure 10. Grade 5 Math (Geometry, Measurement)--distribution of KCCT operational items by content standard designation (primary vs. primary, secondary, and tertiary) and by degree of match to NAEP content standards

Standards not represented by KCCT operational items:

2.2.002—no match to NAEP content standard(s)
2.2.009—no match to NAEP content standard(s)
2.3.002—exact match to NAEP content standard(s)
2.3.004—exact match to NAEP content standard(s)

Black bars indicate exact matches between KCCT and NAEP content standards; white, no matches; and gray, partial/close/unsure matches.

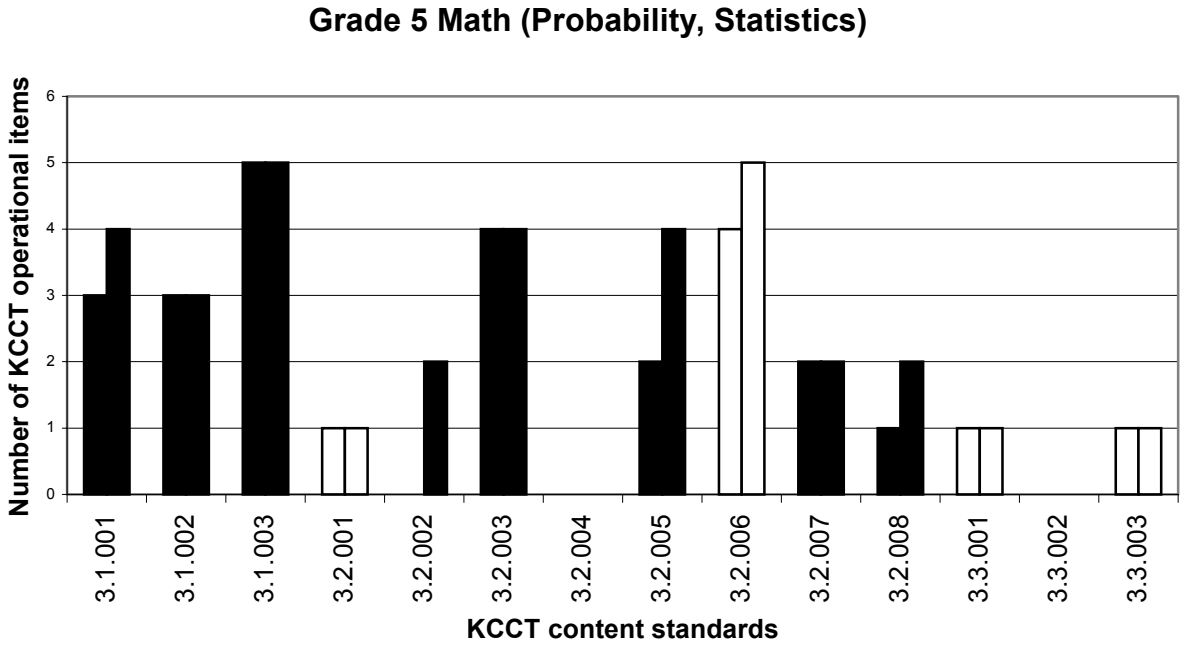


Figure 11. Grade 5 Math (Probability, Statistics)--distribution of KCCT operational items by content standard designation (primary vs. primary, secondary, and tertiary) and by degree of match to NAEP content standards

Standards not represented by KCCT operational items:

3.2.004—no match to NAEP content standard(s)
3.3.002—no match to NAEP content standard(s)

Black bars indicate exact matches between KCCT and NAEP content standards; white, no matches; and gray, partial/close/unsure matches.

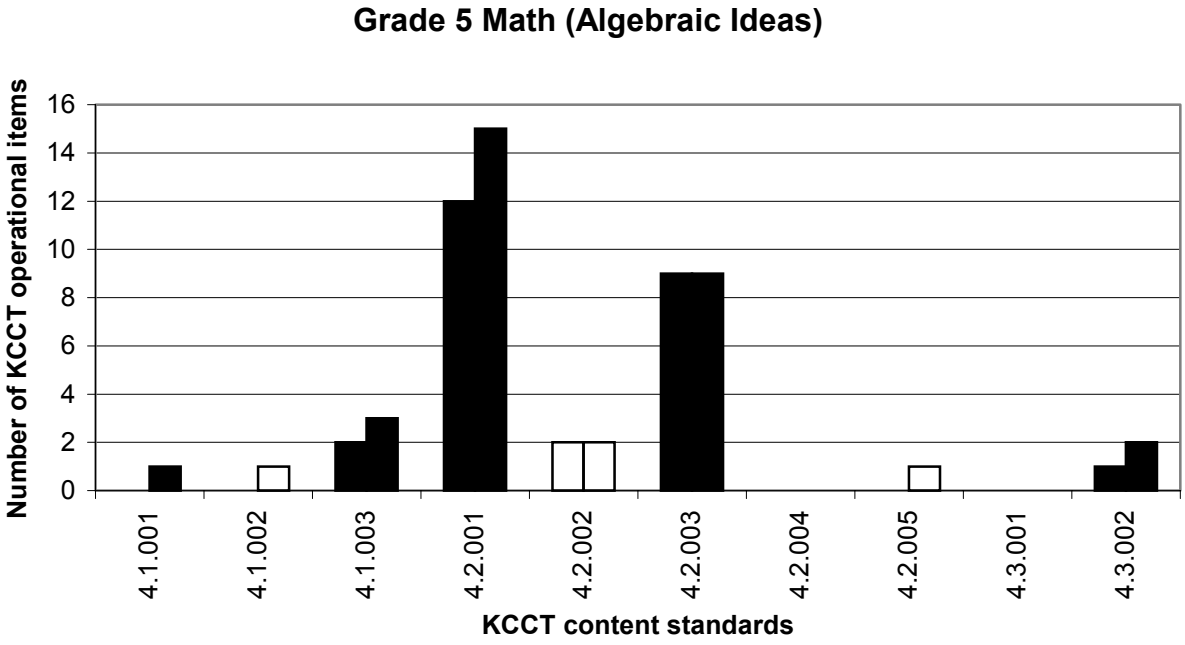


Figure 12. Grade 5 Math (Algebraic Ideas)--distribution of KCCT operational items by content standard designation (primary vs. primary, secondary, and tertiary) and by degree of match to NAEP content standards

Standards not represented by KCCT operational items:

4.2.004—exact match to NAEP content standard(s)
4.3.001—exact match to NAEP content standard(s)

Black bars indicate exact matches between KCCT and NAEP content standards; white, no matches; and gray, partial/close/unsure matches.

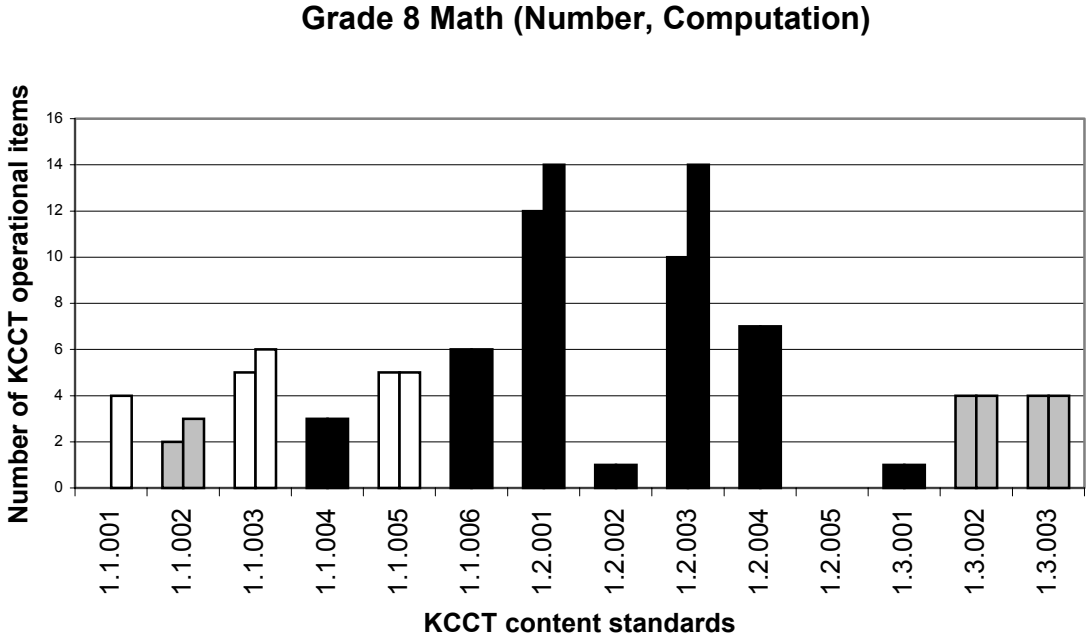


Figure 13. Grade 8 Math (Number, Computation)--distribution of KCCT operational items by content standard designation (primary vs. primary, secondary, and tertiary) and by degree of match to NAEP content standards

Standards not represented by KCCT operational items:

1.2.005—partial/close/unsure match to NAEP content standard(s)

Black bars indicate exact matches between KCCT and NAEP content standards; white, no matches; and gray, partial/close/unsure matches.

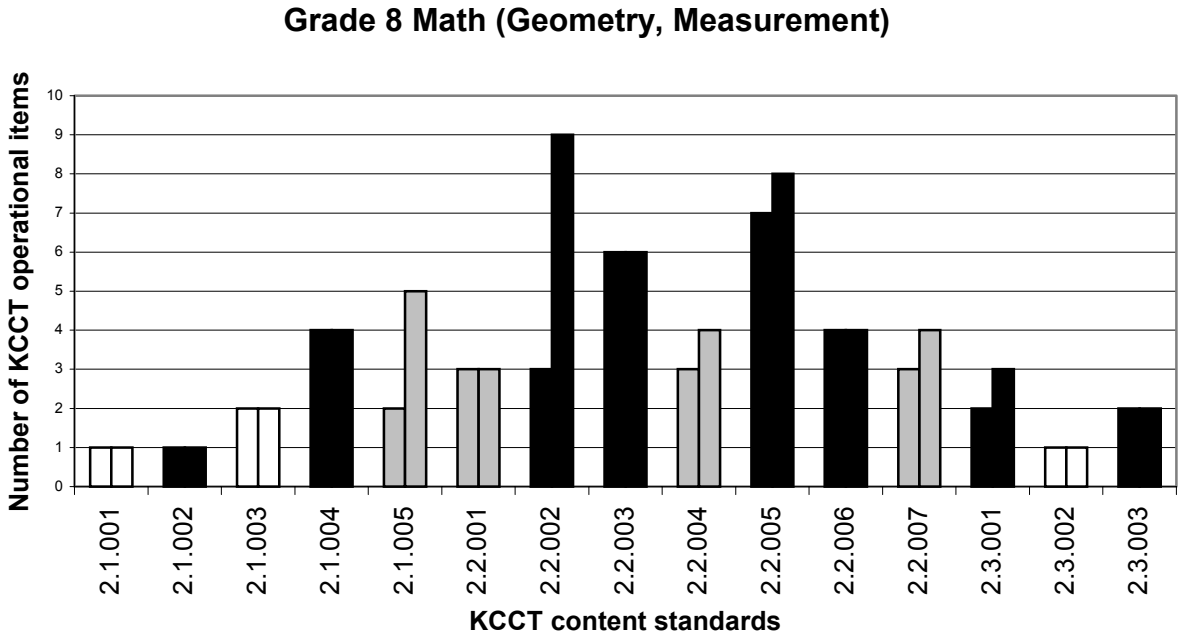


Figure 14. Grade 8 Math (Geometry, Measurement)--distribution of KCCT operational items by content standard designation (primary vs. primary, secondary, and tertiary) and by degree of match to NAEP content standards

Black bars indicate exact matches between KCCT and NAEP content standards; white, no matches; and gray, partial/close/unsure matches.

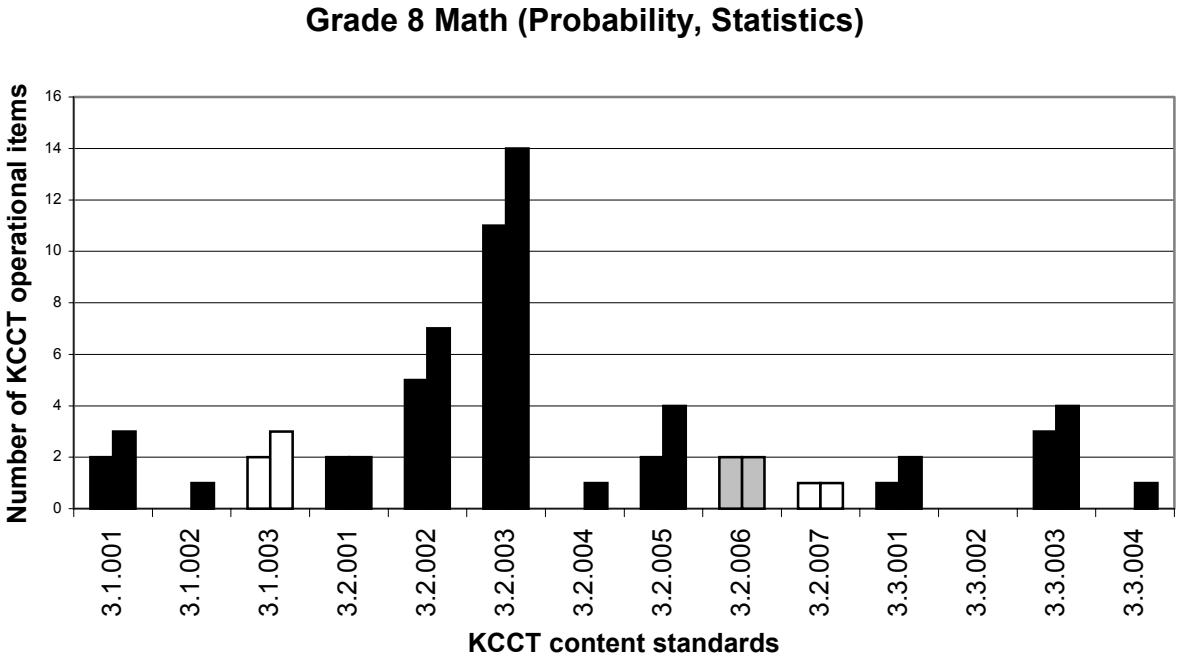


Figure 15. Grade 8 Math (Probability, Statistics)--distribution of KCCT operational items by content standard designation (primary vs. primary, secondary, and tertiary) and by degree of match to NAEP content standards

Standards not represented by KCCT operational items:

3.3.002—exact match to NAEP content standard(s)

Black bars indicate exact matches between KCCT and NAEP content standards; white, no matches; and gray, partial/close/unsure matches.

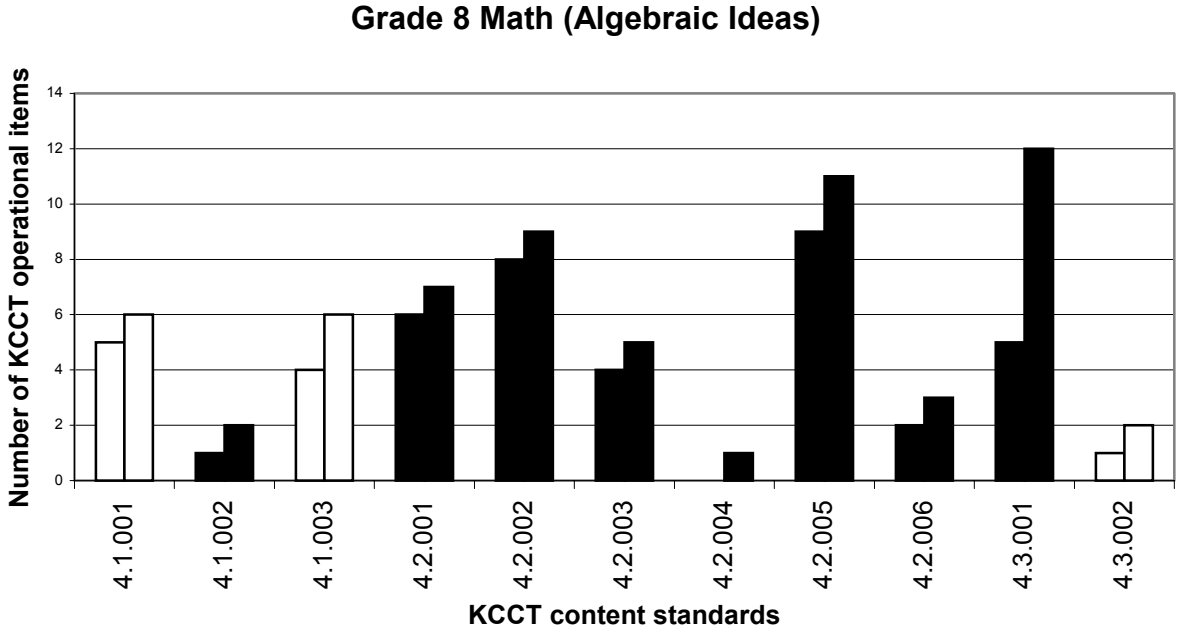


Figure 16. Grade 8 Math (Algebraic Ideas)--distribution of KCCT operational items by content standard designation (primary vs. primary, secondary, and tertiary) and by degree of match to NAEP content standards

Black bars indicate exact matches between KCCT and NAEP content standards; white, no matches; and gray, partial/close/unsure matches.

The next step that researchers took was preparing tables that summarize some of the findings from the graphs. Table 21 shows the number of KCCT content standards assigned per grade/subject, the number of KCCT content standards that are unrepresented (that is, that have no operational items), and the degree of match to NAEP content standards that the unrepresented standards have. This issue may become important when developing a system through which NAEP and KCCT may be compared. Knowing which areas of the two frameworks are similar and which are different, or which do not match at all, is a necessary step. Results show that even though some unrepresented KCCT primary content standards are exact matches to NAEP content standards, they are not represented by KCCT operational items. Thus, there is no way to link these unrepresented KCCT primary content standards to NAEP standards through actual student performance. Using KCCT secondary or tertiary content standards in addition to the primary content standards may be possible (results are presented in Table 22), although decisions must be made as to how best to make these comparisons. Hoffman and Bacci (2003) present more complete information on KCCT items' secondary and tertiary content standards in addition to their primary content standards.

Table 21. Unrepresented KCCT primary content standards by degree of match to NAEP standards, by grade and subject

Grade/subject	Total number of KCCT standards assigned	Number of KCCT standards unrepresented by items	Degree of match of unrepresented KCCT primary content standards to NAEP content standards		
			Exact/very close match	Close/unsure	No match
Grade 4 Reading	38	13 .34	1	1	11
Grade 7 Reading	61	15 .25	6	3	6
Grade 5 Math	59	15 .25	8	N/A	7
Grade 8 Math	54	7 .13	5	1	1

Table 22 presents similar information, although it uses secondary and tertiary standards as well as primary standards. Note that the number of unrepresented KCCT standards has been reduced through the use of the secondary and tertiary standards. Grade 4 Reading, for example, had 13 unrepresented standards in the previous table and now has 10. Further examination shows that 9 Grade 4 Reading standards are still unrepresented in the "No match" category, compared to 11 in the previous table, and that there are no unrepresented standards in "Close/unsure" category, compared to 1 in the previous table. The number of unrepresented standards remains unchanged in the "Exact/very close match" category for Grade 4 Reading, with 1 remaining there. However, the number of unrepresented standards (across all four grade/subject combinations) that are also exact matches to some NAEP standards has been reduced overall, from 20 (using only primary content standards) to 10 (using primary, secondary, and tertiary content standards).

Table 22. Unrepresented KCCT primary, secondary, and tertiary content standards by degree of match to NAEP standards, by grade and subject

Grade/subject	Total number of KCCT standards assigned	Number of KCCT standards unrepresented by items	Degree of match of unrepresented KCCT primary, secondary, and tertiary content standards to NAEP content standards		
			Exact/very close match	Close/unsure	No match
Grade 4 Reading	38	10 .26	1	0	9
Grade 7 Reading	61	12 .20	4	2	6
Grade 5 Math	59	8 .14	4	N/A	4
Grade 8 Math	54	2 .04	1	1	0

Table 23 presents the actual content standards unrepresented by KCCT operational items (see previous table); note that these content standards also appear below the corresponding graphs (Figures 1-16).

Table 23. Unrepresented KCCT standards identified by grade, subject, subdomain, and content statement

Grade 4 Reading			
Literature	Informational	Persuasive	Practical/Workplace
N/A	2.0.002 2.0.004 2.0.005	3.0.002 3.0.003 3.0.004 3.0.008	4.0.001 4.0.004 4.0.005
Grade 7 Reading			
Literature	Informational	Persuasive	Practical/Workplace
1.0.005 1.0.007	2.0.007	3.0.002 3.0.003 3.0.005 3.0.010 3.0.012 3.0.017	4.0.004 4.0.005 4.0.007

Grade 5 Math			
Number/Comp	Geometry/Measure	Probability/Stats	Algebraic Ideas
N/A	2.2.002	3.2.004	4.2.004
	2.2.009	3.3.002	4.3.001
	2.3.002		
	2.3.004		
Grade 8 Math			
Number/Comp	Geometry/Measure	Probability/Stats	Algebraic Ideas
1.2.005	N/A	3.3.002	N/A

Researchers also prepared tables that summarize the uneven distribution of operational items that is apparent in the figures. This uneven distribution is evident between content areas within a single grade and subject and between grades within the same subject. For example, the Grade 4 Reading graphs (Figures 1-4), in particular, show that operational KCCT items are unevenly distributed among the KCCT content standards. In the Literature content area, we see that one content standard, 1.0.6 (Explain the meaning of a passage taken from texts appropriate for elementary school students), accounts for one half of the items assigned to this area, with 44 of 90 items. The Grade 4 Informational Reading also is unevenly distributed, with one content standard, 2.0.8 (Identify main ideas and details that support them), accounting for 32 of 45 operational questions. Grade 7 Reading also appears somewhat unevenly distributed, while Grades 5 and 8 Mathematics items are more evenly distributed among the content standards.

This information, when combined with information on the degree of match between KCCT and NAEP standards, helps give a more complete picture of the degree of match between the two testing systems. Table 24 shows the number and percentage of operational items (by content strand) whose primary content standards exactly matched at least some NAEP content standards. For example, Grade 4 Reading shows that 77 of the 90 literature items (86%) represent KCCT primary content standards that are exactly matched to NAEP content standards. There are 84 of 180 operational KCCT items (47%) representing KCCT primary content standards that were exactly matched to NAEP content standards in Grade 4 Reading. Note that workshop participants believed that some NAEP and KCCT standards were exact matches in persuasive and practical/workplace reading, even though those particular reading types were not assessed in certain grades on NAEP.

Table 24. Number and percentage of "exact match" KCCT operational items by subject, grade, and content area using only primary content standards

Reading	Literature	Informational	Persuasive[1]	Practical/Work[2]	Total
Grade 4	77 of 90 .86	2 of 45 .04	0 of 15 .00	5 of 30 .17	84 of 180 .47
Grade 7	54 of 65 .83	39 of 45 .87	8 of 20 .40	42 of 50 .84	143 of 180 .79
Mathematics	Number, Computation	Geometry, Measurement[3]	Probability, Statistics	Algebraic Ideas	Total
Grade 5	48 of 82 .59	21 of 45 .47	20 of 27 .74	24 of 26 .92	113 of 180 .63
Grade 8	40 of 60 .67	29 of 44 .66	26 of 315 .84	35 of 45 .78	130 of 180 .72

[1]NAEP does not assess at Grades 4 and 8
[2]NAEP does not assess at Grade 4
[3]NAEP splits geometry and measurement into separate content strands

Table 24 shows the weakest relationship between KCCT and NAEP in Grade 4 Reading and the strongest in Grade 7 Reading, based on the number of operational KCCT items that represent KCCT primary content standards that are exactly matched to NAEP content standards. There are several caveats to this information: first of all, it must be remembered that we considered only the primary content standard for each item in determining the KCCT content standard to be matched to a NAEP content standard. Secondly, we considered only "exact" matches, as determined by workshop participants, rather than those classified as "close" or "partial" matches. Third, in Grade 8 Math an exact match sometimes resulted from two or more partial matches; in effect, one partial match covered one portion of a standard while another partial match covered the remainder of the standard. Thus, the total effect was an exact match resulting from several partial matches.

Table 25 presents similar information on operational items, this time using primary, secondary, and tertiary content standards to determine the degree of match to NAEP content standards. Even though there are still only 180 operational items per grade/subject, each content standard was given equal weight and was tallied each time it was assigned to an operational item. Therefore, some items are "double counted" or even "triple counted" depending on whether they carry secondary or secondary and tertiary content standards. Results show minor changes when using primary, secondary, and tertiary content standards, compared to only using primary content standards. As we saw previously, the weakest relationship between NAEP and KCCT remains at Grade 4 Reading and the strongest in Grade 7 Reading.

Table 25. Number and percentage of "exact match" KCCT operational items by subject, grade, and content area using primary, secondary, and tertiary content standards

Reading	Literature	Informational	Persuasive[1]	Practical/Work[2]	Total
Grade 4	121 of 144 .84	8 of 74 .11	0 of 18 .00	10 of 39 .26	144 of 275 .52
Grade 7	83 of 94 .88	58 of 64 .91	11 of 24 .46	68 of 81 .84	220 of 236 .84
Mathematics	Number, Computation	Geometry, Measurement[3]	Probability, Statistics	Algebraic Ideas	Total
Grade 5	75 of 114 .66	29 of 54 .54	26 of 34 .76	30 of 34 .88	160 of 236 .68
Grade 8	46 of 72 .64	37 of 57 .65	39 of 45 .87	50 of 64 .78	172 of 238 .72

[1]NAEP does not assess at Grades 4 and 8
[2]NAEP does not assess at Grade 4
[3]NAEP splits geometry and measurement into separate content strands

Test Administration

KCCT and NAEP are administered in very different ways. These differences in administration could cause differences in students' scoring patterns and in the results reported by the assessments. Table 26 outlines the major differences in the administration of the two tests.

Table 26. KCCT versus NAEP test administration

	KCCT administration	NAEP administration
1.	KCCT is required for all Kentucky public schools.	NAEP is administered to a small sample of Kentucky schools.
2.	KCCT is taken by all public school students in the assessed grades.	NAEP tests a sample of students within a school, and only tests all students in a school under special circumstances.
3.	KCCT is administered by classroom teachers and other school personnel.	NAEP is administered by administration contractors hired specifically for this purpose.
4.	KCCT scores result in school-level consequences or rewards.	NAEP scores are aggregated at the state level only. There are no school-level scores and no school-level consequences.
5.	Schools may design student-level consequences or rewards for completion of KCCT.	No consequences or rewards for completion of tests.
6.	Students may take as many as 4 KCCT component tests during the school's testing window.	Students typically take only one NAEP test in a given school year.

7.	Schools regularly hold test scrimmages or preparation workshops to prepare for KCCT.	No scrimmages or workshops are typically employed to prepare for NAEP.
8.	KCCT allows several accommodations for special needs students not allowed by NAEP, most notably readers for the reading test.	NAEP allows accommodations for special needs students, but is not as inclusive as KCCT. NAEP does not allow readers for the reading test.
9.	Most severely handicapped students participate in KCCT via the alternate portfolio.	No method of assessing the most severely handicapped students is provided.
10.	Extra time is provided for students providing they are making progress and the time does not extend beyond the school day for KCCT.	NAEP is strictly timed, although the time allotted is sufficient that most students finish.
11.	KCCT is typically administered in students' own classrooms.	NAEP can be administered in students' classrooms, but administration is typically in a central location (e.g. library).
12.	KCCT provides minimal manipulatives (a ruler/straightedge in math). Eighth grade students may also use a protractor or angle ruler.	NAEP math provides a variety of manipulatives (geometric shapes or spinners for example). No tools not provided by NAEP are allowed.
13.	Students may use a calculator for any section on KCCT.	Calculator use on NAEP is reserved for certain sections of certain forms.
14.	Students requiring a reader to access KCCT are provided one-on-one assistance.	NAEP might have one reader for several students as an accommodation. No reader is allowed for the reading test.
15.	KCCT has implemented a new CATS-Online system to give better access to the test for students with disabilities (includes text-reader software, etc.).	NAEP does not have a similar computer administered version.

Score Computation

Some of the most striking differences between KCCT and NAEP occur after the assessments have been administered. Because the two tests serve very different purposes, the manner in which students' responses to test items are treated is also very different. KCCT was designed primarily as a measure of school progress and is used to hold schools accountable for student achievement. It also serves at least two secondary purposes. Student-level scores are reported in addition to school indexes so that students, teachers, and parents can gauge each student's individual achievement. KCCT is also used to foster education reform in Kentucky. The format of the test and the manner in which it is scored are designed to foster particular instructional practices in Kentucky's classrooms.

NAEP, on the other hand, is designed to produce scores only at the aggregate level. Individual students' scores are never directly computed. Neither students nor schools receive scores based on NAEP. For that reason, NAEP need not test all schools within a state, or all students within a school. NAEP uses a complex sampling procedure to represent each participating state. Groups of interest (based on ethnicity, poverty, disability, etc.) are sampled in that system. Both NAEP and KCCT have several different test forms, but where those forms must be equivalent for individual reporting of KCCT scores, NAEP is not so restricted.

The following table outlines several differences in the scoring and reporting of KCCT versus NAEP.

Table 27. Scoring and reporting differences between KCCT and NAEP

	KCCT scoring/reporting	NAEP scoring/reporting
1.	Individual student scores calculated and reported.	Individual student scores not directly calculated.[4]
2.	School index scores computed from student scores.	School scores not calculated.
3.	State-level results are calculated by combining student and school scores.	State-level results are the product of the scoring pattern of the sample of students selected to represent Kentucky.
4.	Item parameters are used to create raw-score-to-scale-score tables that are used for assigning performance categories to students.	The overall pattern of responses to the test items among sampled students is used to estimate the distribution of performance of all students.
5.	Open-response items are given twice the weight that multiple-choice items are given when computing scores.	Pattern scoring allows all items and item types to contribute to the estimation according to each item's particular parameters.
6.	KCCT scores are combined with NRT data and non-academic data in order to compute a school index score.	NAEP scores are based only on the administration of the subject tests and scores apply only at the state level.
7.	KCCT reports sub-domain scores within tested subjects based on students' raw scores.	NAEP also reports sub-domain scores, but uses IRT (Item Response Theory) to estimate them and does not report the same sub-domain scores as reported from KCCT.
8.	Students might be rewarded at their school for scoring well or for completing all parts of the KCCT tests.	NAEP rewards all students participating with a certificate of appreciation only.
9.	KCCT performance categories were set by Kentucky educators and incorporate Kentucky's pre-NCLB definition of proficiency.	NAEP performance categories do not necessarily match Kentucky's and may define proficiency differently.

[4] NAEP does calculate "plausible values" for students in the sample. However, these scores are best interpreted as scores for students similar to those sampled, rather than scores for the particular students taking the assessment.

	KCCT scoring/reporting	NAEP scoring/reporting
10.	KCCT allows a read-aloud accommodation for the reading test.	NAEP does not allow any part of the reading test to be read aloud to students.
11.	KCCT includes an alternate portfolio option for assessing Kentucky's most severely disabled students.	The most severely disabled students are excluded from NAEP.
12.	KCCT has an option for certain disabled students to take a computer administered version of the test.	NAEP does not have the computer administered option.
13.	KCCT is designed to foster improvement, so schools receive rewards/consequences based on gain scores.	NAEP monitors long term trends, but ranks states based on one-time performance. No rewards/consequences beyond reporting are issued.
14.	KCCT is equated across forms to ensure score equivalency and content experts ensure that the standards are represented by test items of similar content on all forms.	NAEP is also equated across forms for scoring equivalency; however; individual students may perform very different tasks depending on the particular form they receive.
15.	KCCT is equated from year to year in order to measure school growth.	NAEP is equated from one reporting year to the next (every 4 years). NAEP is moving toward state-level reports every other year, however.

Discussion

This section presents comments that came about during the course of the workshops, both during group discussion periods and regular work sessions. This section is organized by content area and further broken into comments about content, test format, test administration, and scoring. Note that some points raised by teachers have strayed from the first, second, and fourth comparisons (content standards, performance standards, and item format, respectively) and are more properly associated with the fifth and sixth comparisons (test administration and score computation, respectively). However, these comments are included in order to capture more completely what took place during the workshop.

Content

Reading

Perhaps one of the most significant differences in the two reading tests is the content that is tested. NAEP tests only literary and informational reading at Grade 4; at Grade 8, it adds practical/workplace reading. KCCT, on the other hand, tests both Grade 4 and Grade 7 students on four types of reading: literary, informational, practical, and persuasive. Thus we can see that, particularly at Grade 4, there is a large area of content that is not tested on NAEP, but which is on KCCT. Another apparent disconnect in the content being tested is the lack of a reading skills testing component on NAEP, while KCCT tests students on five reading skills components. These reading skills comprise aspects of reading such as word recognition strategies; knowledge

of synonyms, antonyms, and homonyms, and compound words; the multiple meanings of some words; recognition of a word's meaning when a suffix or prefix has been added; and recognition of the purpose of mechanics such as punctuation, capitalization, boldface type, italics, and indentations. These skills are tested within each of the four types of reading.

The lack of a reading skills component on NAEP has an impact on the way that items from both systems appear on the teacher-created taxonomy. Teachers found that they placed many KCCT reading skills items at lower levels of the taxonomy, thus having fewer items from the released test form available for placement at higher levels of the taxonomy. NAEP, on the other hand, lacks this component, and more of its items are placed at the higher levels of the taxonomy as a result.

Mathematics

As in reading, mathematics participants found differences between the two frameworks. The KCCT framework contains four content areas and the NAEP framework contains five content areas. It also should be noted that at the 4th/5th grade level, there are approximately the same number of standards in the KCCT framework (59) as there are in the NAEP framework (56). At the 8th grade level, there are almost twice as many standards in the NAEP framework (103) as there are in the KCCT framework (54). The 8th grade math participants found that there was a considerable amount of overlap in the standards. While the participants found about a 60% exact match in the standards, this was not a one-to-one match. Instead, they found that while a KCCT standard may be totally matched in the NAEP framework, there may be multiple NAEP standards that each cover a portion of the KCCT standard.

Looking at the KCCT-NAEP exact match standards that are covered by KCCT operational items, we found that there were approximately two-thirds coverage for the 5th grade items and almost three-fourths coverage for the 8th grade items. However, within the content areas there was a wide variation in coverage, especially at the 5th grade level. At the low end was the Geometry Measurement with only a 47% match, while at the upper end there was a 92% match in Algebraic Ideas. At the 8th grade level there was less of a gap, with the range being 66-67% for Number Computation and Geometry Measurement respectively and 84% for Probability and Statistics.

Test Format

Differences in formatting are present, as well. For example, Kentucky has a total of 144 multiple-choice and 36 open-response items that are distributed among 6 operational test forms[5]. Each reading test form has 24 multiple-choice and 6 open-response operational items (each form also has 4 multiple-choice and 1 open-response field-test items that are scored but which are not included in students' overall scores). Students can earn 1 point for each correct operational multiple-choice answer and from 0 to 4 points for an open-response answer, which is scored by a rubric.

[5] KCCT has 6 forms, each with an A and B version. A and B versions differ only on field-test items.

In addition to multiple-choice questions, NAEP has two types of constructed response questions: short constructed response items that require a one- or two-sentence answer, and extended constructed responses that require a paragraph or full-page response. The maximum score that a short response item can receive is 3 points; an extended response item can earn a maximum of 4 points. The items are divided among at least eight different test booklets. Teachers said that extended constructed items appeared similar to KCCT open-response items.

Test Administration

KCCT tests are not timed; students can take as long as they want as long as they are making progress on the test. NAEP, however, limits testing time to 50 minutes, either in two 25-minute blocks or in one 50-minute block. It is unclear what the impact may be on students who are more accustomed to one or the other system. If students are more familiar with an untimed reading test, for example, might they feel rushed or pressured to complete a test within 50 minutes?

The tested population also differs between the two systems. Both systems allow a student to use certain accommodations if they are specified in the student's Individualized Educational Plan (IEP). However, NAEP appears to accept fewer accommodations than does KCCT. For example, NAEP does not permit the use of a reader who would read the reading assessment to the student, although NAEP does permit other accommodations, such as extra testing time, individual/small group administrations, large-print test booklets, and multiple testing sessions, if specified in a student's Individual Educational Plan (IEP). A student whose IEP specifies a reader for all testing is exempted from the NAEP reading test, but not math. The KCCT, on the other hand, permits the use of a reader if the IEP specifies it as an accommodation for the student. It also provided, for the first time in spring 2003, an online version of the exam with a text-reader function for those students.

Test Scoring

Teachers also noted differences in the achievement levels designated by each testing system. NAEP, for example, reports student achievement with a three-level system:

- Advanced, indicating superior performance,
- Proficient, indicating solid academic performance,
- Basic, indicating partial mastery of prerequisite knowledge and skills (p. 27, Reading Framework for the 2003 National Assessment of Educational Progress).

NAEP also recognizes that some students perform at a "Below Basic" achievement level, and it provides some information on students performing at that low level (p. 32, Reading Framework).

KCCT, on the other hand, uses a four-level system in reporting student achievement in reading:

- Distinguished, indicating in-depth knowledge or extensive understanding,

- Proficient, indicating overall knowledge or understanding,
- Apprentice, indicating literal knowledge or some understanding, and
- Novice, indicating minimal and/or incorrect knowledge or minimal understanding (Student Performance Level Descriptions, 8/1/01, www.kde.state.ky.us/KDE/Instructional+Resources/Curriculum+Documents+and+Resources/Student+Performance+Standards.htm).

The apprentice and novice categories are further broken into low, medium, and high performance levels.

Conclusions

NAEP scores are commonly used to compare one state's educational progress to another. NAEP is also used as a measuring stick for educational reform efforts conducted within states. When NAEP scores improve, the improvement is often interpreted as evidence that a state's reform efforts are working. When NAEP scores fail to improve, those efforts are called into question. The link between student performance on NAEP and the effectiveness of state-level reform efforts, however, remains unknown. This link will take on ever-greater significance as NCLB requires states to define proficiency and move all students toward that goal.

On one hand, NAEP scores and state assessment scores should be positively correlated. Mathematics ability is typically assessed by both NAEP and state-level tests, so strong mathematics students should score well on both. We know from previous research linking KCCT data with ACT data and other measures that high-ability students tend to score well on various tests. On the other hand, the strength of that correlation may be influenced by an array of variables. The more similar the two measures are, the stronger the correlation should be. So, unless states were to use NAEP (or a very similar assessment) to gauge students' proficiency, the correlation cannot and should not be perfect. The more dissimilar the state assessment and NAEP are, the lower the correlation will likely be.

This report points out some striking differences between NAEP and KCCT. The two assessments are constructed from differing blueprints. They measure differing standards. Test items are constructed differently and are often formatted differently. The assessments serve widely divergent purposes, so test administration and scoring are conducted in very different ways. Comparisons between scoring patterns on NAEP and KCCT should be made cautiously and with many caveats. This holds true for comparisons within a single year as well as any examination of trends across years. It holds true for NCLB's groups of interest. As Kentucky strives to reduce the scoring gaps between these groups, it is very possible that KCCT and NAEP may differ in defining those gaps. Caution is also warranted because of the way proficiency is defined and determined on NAEP and KCCT. The proportion of students defined as proficient on one test may vary significantly on the other. NAEP can serve as one indication of the ability level and progress of Kentucky's students. KCCT results, however, should not be expected to mirror NAEP given the differences discussed here.

Appendix A

Appendix A contains KDE and NAEP websites used as resources for standards, released items, and information about the testing systems, as well as other references.

References

Bloom, B. S. (Ed.). (1956). *Taxonomy of Educational Objectives: Cognitive Domain.* New Yourk: David McKay Co., Inc.

Hoffman, R. G. & Bacci, E. D. (2003). *Item content and difficulty mapping by form and item type for the 2002 Kentucky Core Content Tests.* (HumRRO Report No. FR 03-01). Alexandria, VA: Human Resources Research Organization.

KDE websites used for workshops

For mathematics and reading Core Content for Assessment:

http://www.Kentuckyschools.net/KDE/Instructional+Resources/Curriculum+Documents+Resources/Core+Content+for+Assessment.htm

For mathematics and reading released test items:

http://www.Kentuckyschools.net/KDE/Instructional+Resources/Curriculum+Documents+and+Resources/Released+Test+Items.htm, 1999 elementary and middle school mathematics and reading released forms

NAEP websites used for workshops

For frameworks:

http://www.nagb.org/pubs/read_fw_03.pdf

http://www.nagb.org/pubs/math_fw_03.pdf

For math and reading released test items:

http://nces.ed.gov/nationsreportcard/itmrls/pickone.asp

NAEP requires that individual released items be credited with their year and test block; this information appears in the following table.

NAEP Grade 4 Mathematics			NAEP Grade 8 Mathematics		
Question #	Year	Block	Question #	Year	Block
1-10	1996	4M9	1-13	1996	8M3
1-6	1996	4M10	1-7	1996	8M10
1-9	1996	4M12	1-9	1996	8M12
1-17	1992	4M5	1-21	1992	8M5
1-10	1992	4M7	1-2	1992	8M7
1-2	1992	4M12			
NAEP Grade 4 Reading			NAEP Grade 8 Reading		
1-9	2000	4R8	1-8	1998	8R4

1-10	1998	4R6	1-11	1994	8R3
1-11	1994	4R3	1-9	1994	8R8

Demonstration booklets in math and reading:

http://nces.ed.gov/nationsreportcard/pdf/demo_booklet/gr4demobook.2003.pdf

http://nces.ed.gov/nationsreportcard/pdf/demo_booklet/gr8demobook.2003.pdf

Appendix B

Appendix B contains the agenda given to workshop participants and task descriptions.

Agenda
NAEP-KY Comparison

DAY 1

8:45 am—Introduction, purpose of this work, divide into grade/content groups and move to assigned rooms

9 am—Be in assigned rooms, individual introductions (HumRRO staff and teachers), explain what we will be doing

9:15 am—Distribute NAEP and KCCT frameworks for Task 1. To be completed NLT noon.

Noon-1 pm—Lunch

1 pm—Begin Task 2 (will continue this activity through remainder of Day 1).

Around 4 pm—Dismiss for day.

DAY 2

8-8:30 am—Continental breakfast in office.

8:45 am—Assemble in individual workrooms, recap of Day 1 for newcomers. Finish Task 2 if necessary (finish with Task 2 NLT noon)

Noon-1 pm—Lunch

1 pm—Begin Task 3; complete by 3 pm.

3 pm—Begin Task 4; continue through end of day.

4 pm—Dismiss for day.

DAY 3

8-8:30 am—Continental breakfast in office.

8:45 am—Continue with Task 4, if necessary (complete NLT 11 am).

11 am—Begin Task 5

Noon-1 pm—Lunch

1 pm—Continue Task 5, Begin Task 6

4 pm—Dismiss.

Workshop Tasks

Task 1—Content Overlap

Teachers will try to match specific NAEP and KCCT framework items with each other. Framework items that match exactly or very nearly will be placed in Pile 1, while Pile 2 is for those items that match somewhat closely or for those items about which teachers are unsure. Pile 3 is for those items that are found only in the KCCT standards and Pile 4 for those items found only in the NAEP standards. Teachers should be prepared to explain their reasoning for placing items where they did. As item replacement is resolved, items should be taped or glued to large sheets of paper (one sheet/pile). This task should be completed NLT noon on Day 1.

Task 2—Test Item Matching

Teachers will be given released test items from NAEP and KCCT and they will match each item to the standard it most closely represents. Items will be taped/glued next to the appropriate standards. This activity will continue through the end of the day.

Task 3—Sorting Test Items by Cognitive Complexity

Teachers will be given a duplicate set of released items, and they will sort individual items by cognitive complexity from "Simplest" to "Most Complex."

Task 4—Developing a Hierarchy or Taxonomy

Teachers will establish cutpoints for their item arrays, deciding which items are similar in cognitive demand and when the demand shifts to more complex. Be prepared to explain reasoning.

Task 5—Comparing Item Types

Teachers will be given fresh copies of the released items. They will examine items by type (multiple choice, open response) to determine whether there are significant differences between tests in the way MC and OR questions are written (distracters, language used, etc.). Again, teachers should be prepared to explain their reasoning through specific examples.

Task 6—Examine Reading Passages

Teachers will examine reading passages that accompany the released items for differences in length, difficulty, language load/vocabulary and determine whether selections on one test are more challenging.

Appendix C

Appendix C consists of tables containing KCCT standards matched with NAEP standards.

Elementary Reading content standards comparisons

Elementary reading—exact/very close matches of NAEP and KCCT reading standards

Kentucky Core Content for Assessment	NAEP Frameworks
Literature RD-E-1.0.1. Use word recognition strategies (e.g., phonetic principles, context clues, structural analysis) to determine pronunciations and meanings of words in passages	Literary Text—Vocabulary X Developing Interpretation "Which words let you know that time has gone by? Explain with evidence from the story." Literary Text—Vocabulary X Examining Content and Structure "Why does the author use the words _____ to describe how _____ feels?" Literary Text—Vocabulary X Forming a General Understanding "Which words describe what the story is mostly about? Use evidence from the t ext to support your response."
Literature RD-E-1.0.3. Know that some words have multiple meanings and identify the correct meaning as the word is used Persuasion RD-E-3.0.3. Know that some words have multiple meanings and identify the correct meaning as the word is used. Practical/Workplace RD-E-4.0.3. Know that some words have multiple meanings and identify the correct meaning as the word is used.	Literary Text—Vocabulary X Making Reader/Text Connections "Explain the double meaning of _____. Tell which meaning better explains the major ideas in the passage."
Literature RD-E-1.0.6. Explain the meaning of a passage taken from texts appropriate for elementary students	Literary Text—Major Events X Forming General Understanding "Write a short summary of the major events in the story." Informational Text—Major Ideas X Forming General Understanding "Give a summary of the major ideas."
Literature RD-E-1.0.8. Describe characters, plot, setting, and problem/solution of a passage	Literary Text—Problem X Forming General Understanding "How does _____ make the problem worse? Use evidence from the text to support your response." Literary Text—Theme X Developing Interpretation "How does the setting help to illustrate the theme of the story?" Literary Text—Major Events X Making Reader/Text Connections "How do you think the story would have ended if _____had not happened?"
Literature RD-E-1.0.9. Explain a character's actions based on a passage	Literary Text—Major Characters X Examining Content and Structure "How does the author's description of ____ help explain the character's actions?" Literary Text—Major Characters X Developing Interpretation

Kentucky Core Content for Assessment	NAEP Frameworks
	"What causes the main character to do _____? Use evidence from the story in your response." Literary Text—Major Characters X Forming General Understanding "What was the major character's opinion of _____" Literary Text—Problem X Developing Interpretation "How did _____ help solve the problem?"
Information RD-E-2.0.3. Know that some words have multiple meanings and identify the correct meaning as the word is used	Informational Text—Vocabulary X Developing Interpretation "Which words do you think mean the same as the title? Tell why you think so." Informational Text—Vocabulary X Making Reader/Text Connections "Explain the double meaning of _____. Tell which meaning better explains the major ideas in the passage."
Information RD-E-2.0.6. Use text features (e.g., pictures, lists, tables, charts, graphs, tables of contents, indexes, glossaries, headings, captions) to understand a passage Practical/Workplace RD-E-4.0.10. Identify text features and organizational aids (e.g., bold face print, italics, illustrations) that provide additional clarity	Informational Text—Adjunct Aids X Forming General Understanding "The chart in this article is mostly used to _____?" Informational Text—Adjunct Aids X Making Reader/Text Connections "Why did the author include the picture with the chart? Explain using what you know and information from the text." Informational Text—Adjunct Aids X Examining Content and Structure "What is the significance of the map to the article? Explain." Informational Text—Adjunct Aids X Developing Interpretation "How does the information in the chart support the information in the article?"

Elementary reading—close/unsure matches of NAEP and KCCT reading standards

Kentucky Core Content Test	NAEP
Literature RD-E-1.0.7. Demonstrate knowledge of the characteristics of fiction, nonfiction, poetry, and plays	Literary Text Problem X Examining Content and Structure "Why does the author explain the problem in the first part of the story? Explain with evidence from the story." Literary Text Major Events X Examining Content and Structure "How do the first events help you predict the ending?" Literary Text Theme X Examining Content and Structure "Explain what makes this story a fable."

Kentucky Core Content Test	NAEP
Literature RD-E-1.0.6. Explain meaning of passage	Literary Text Theme X Forming General Understanding "What is the moral in the story? Use evidence from the story in your response."
Literature RD-E-1.0.10. Connect literature to students' live and real world issues	Literary Text Major Characters X Making Reader/Text Connections "How do you think the character's actions might be different today? Support with evidence from the story." Literary Text Theme X Making Reader/Text Connections "Do you think the lesson in this story is true today? Why or why not?"
Information RD-E-2.0.8. Identify main ideas and details that support them	Informational Text Supporting Ideas X Developing Interpretation "How does the author show you that the main idea is important?" Informational Text Supporting Ideas X Forming General Understanding "Identify ideas that most closely relate to the topic. Give evidence from the text to support your choice." Informational Text Supporting Ideas X Making Reader/Text Connections "Which details about the _____ help you to have a clear image of the topic? Explain why you chose them."
Information RD-E-2.0.6. Text features	Informational Text Major Ideas X Examining Content and Structure "What did the author do to present information clearly?"
Persuasion RD-E-3.0.6. Identify an author's opinion about a subject	Informational Text Central Purpose X Examining Content and Structure "Based on what you read, what might be the reason the author wrote this?" Informational Text Central Purpose X Forming General Understanding "What might be the author's message in this article?"

Elementary reading—nonmatches of NAEP and KCCT reading standards

Kentucky Core Content Test only
Literature RD-E-1.0.2. Use knowledge of synonyms, antonyms, homonyms, and compound words for comprehension
Literature RD-E-1.0.4 Recognize the meaning of a word when a prefix or suffix has been added to a base word
Literature RD-E-1.0.5. Recognize the purpose of capitalization, punctuation, boldface type, italics, and indentations used by the author
Information RD-E-2.0.10. Connect the content of a passage to students' lives and/or real world issues
Information RD-E-2.0. 1. Use word recognition strategies (e.g., phonetic principles, context clues, structural analysis) to determine pronunciations and meanings of words in passages
Information RD-E- 2.0.2. Use knowledge of synonyms, antonyms, homonyms, and compound words for comprehension
Information RD-E-2.0.4. Recognize the meaning of a word when a prefix or suffix has been added to a base word
Information RD-E-2.0.5. Recognize the purpose of capitalization, punctuation, boldface type, italics, and indentations used by the author

Information RD-E-2.0.7. Identify the organizational pattern in a passage: sequence, cause and effect, and/or comparison and contrast
Information RD-E-2.0.9. Make predictions and draw conclusions based on what is read
Persuasion RD-E-3.0.1. Use word recognition strategies (e.g., phonetic principles, context clues, structural analysis) to determine pronunciations and meanings of words in passages
Persuasion RD-E-3.0.2. Use knowledge of synonyms, antonyms, homonyms, and compound words for comprehension
Persuasion RD-E-3.0.4. Recognize the meaning of a word when a prefix or suffix has been added to a base word
Persuasion RD-E-3.0.5. Recognize the purpose of capitalization, punctuation, boldface type, italics, and indentations used by the author
Persuasion RD-E-3.0.7. Identify fact and/or opinion
Persuasion RD-E-3.0.8. Identify information that is supported by fact
Practical/workplace RD-E-4.0.1. Use word recognition strategies (e.g., phonetic principles, context clues, structural analysis) to determine pronunciations and meanings of words in passages
Practical/workplace RD-E-4.0.2. Use knowledge of synonyms, antonyms, homonyms, and compound words for comprehension
Practical/workplace RD-E-4.0.4. Recognize the meaning of a word when a prefix of suffix has been added to a base word
Practical/workplace RD-E-4.0.5. Recognize the purpose of capitalization, punctuation, boldface type, italics, and indentations used by the author
Practical/workplace RD-E-4.0.6. Locate and apply information for authentic purposes
Practical/workplace RD-E-4.0.7. Follow the directions in a passage
Practical/workplace RD-E-4.0.8. Explain why the correct sequence is important
Practical/workplace RD-E-4.0.9. Interpret specialized vocabulary (words and terms specific to understanding the content) found in practical/workplace passages
NAEP only
Informational Text Vocabulary X Forming General Understanding “Which words describe what the passage is mostly about? Use the evidence from the text to support your choice.”
Informational Text Supporting Ideas X Examining Content and Structure “What information did the author have to know before writing the article?”
Informational Text Vocabulary X Examining Content and Structure “Why did the author give a definition of _____ in paragraph 2?”
Informational Text Central Purpose X Developing Interpretation “How does the author support the message?”
Informational Text Major Ideas X Developing Interpretation “How does the big idea in the first section relate to the big idea in the last section?”
Informational Text Central Purpose X Making Reader/Text Connections “Do you agree with the author’s message? Give evidence from the text.”
Literary Text Problem X Making Reader/Text Connections “How does the problem in the story compare with another story you have read? Include evidence from the text and another story.”
Literary Text Major Events X Developing Interpretation “What happens after _____?”

Inadvertently dropped:
NAEP item Informational Text Major Ideas X Making Reader/Text Connections
“Who might need or want this information? Use details from the text in your answer.”

Middle school reading content standards comparisons

Middle school reading—exact match standards

NAEP standards	KCCT standards
Literary text—Major Characters x Forming General Understanding "What was the major character's opinion of _____?"	Practical/workplace RD-M-4.0.7. Skim to get the general meaning of a passage Literature RD-M-1.0.7. Skim to get the general meaning of a passage
Literary text—Major Events x Making Reader/Text Connections "How do you think the story would have ended if _____ had not happened?"	Literature RD-M-1.0.8. Make predictions, draw conclusions, and make generalizations (?)
Literary text—Major Events x Developing Interpretation "What happens after _____?"	Literature RD-M-1.0.6. Scan to find key information
Literary text—Theme x Examining Content and Structure "Explain what makes this story a fable."	Literature RD-M-1.0.12 Identify characteristics of short stories, novels, poetry, and plays
Literary text—Theme x Developing Interpretation "How does the setting help to illustrate the theme of the story?" Literary text—Theme x Forming General Understanding "What is the moral in the story? Use evidence from the story in your response."	Literature RD-M-1.0.13. Describe literary elements (e.g., characterization, setting, plot, theme, point of view) in a passage)
Literary text—Major Characters x Developing Interpretation "What causes the main character to do _____? Use evidence from the story in your response." Literary text—Problem x Forming General Understanding "How does _____ make the problem worse? Use evidence from the text to support your response." Literary text—Major Characters x Examining Content and Structure "How does the author's description of _____ help explain the character's actions?"	Literature RD-M-1.0.14. Analyze the relationship between events in a story and a character's behavior.
Literary text—Problem x Examining Content and Structure "Why does the author explain the problem in the first part of the story? Explain with evidence from the story." Literary text—Vocabulary x Examining Content and Structure "Why does the author use the words _____ to describe how _____ feels?" Literary text—Major Events x Examining Content and Structure	Literature RD-M-1.0.9. Reflect on and evaluate what is read

"How do the first events help you predict the ending?"	
Literary text—Problem x Making Reader/Text Connections "How does the problem in the story compare with another story you have read? Include evidence from the text and another story."	Literature RD-M-1.0.11. Explain the meaning of a passage taken from texts appropriate for middle school students.
Informational text—Central Purpose x Forming General Understanding "What might be the author's message in this article?"	Literature RD-M-1.0.1. Identify an author's purpose in literary materials
Literary text—Theme x Making Reader/Text Connections "Do you think the lesson in this story is true today? Why or why not?" Literary text—Major Characters x Making Reader/Text Connections "How do you think the character's actions might be different today? Support your response with evidence from the story."	Literature RD-M-1.0.10. Connect information from a passage to students lives and/or real world issues Information RD-M-2.0.10. Connect information from a passage to students' lives and/or real world issues
Literary text—Vocabulary x Making Reader/Text Connections "Explain the double meaning of _____. Tell which meaning better explains the major ideas in the passage."	Literature RD-M-1.0.3. Identify words that have multiple meanings and select the appropriate meaning for the context
Literary text—Problem x Developing Interpretation "How did _____ help solve the problem?"	Literature RD-M-1.0.15. Explain how a conflict in a passage is resolved
Practical text—Key Graphics x Making Reader/Text Connections "Which additional graphics would you add to make the directions clear? Use support from the text." Practical text—Key Graphics x Developing Interpretation "Why does the second picture show _____?" Practical text—Central Purpose x Making Reader/Text Connections "Do you think the directions would be the same for _____? Use evidence from the text." Practical text—Central Purpose x Examining Content and Structure "Is this mainly for readers familiar with this activity? Explain why or why not." Practical text—Key Information x Forming General Understanding "Tell how this information would be useful. Use evidence from the document." Informational text—Vocabulary x Forming General Understanding "Which words describe what the passage is mostly about? Use theh evidence from the text to support your choice."	Practical/workplace RD-M-4.0.9. Reflect on and evaluate what is read

Informational text—Supporting Ideas x Examining Content and Structure "What information did the author have to know before writing the article?" Practical text—Key Graphics x Forming General Understanding "What is the significance of the graphics to the total set of directions? Use support from the text in your response."	
Practical text—Key Information x Developing Interpretation "Why is it important to do _____ before _____? Use evidence from the document in your response."	Information RD-M-2.0.12. Apply knowledge of organizational patterns (e.g., cause and effect, comparison, contrast, sequence) to understand a passage
Practical text—Key Organizing Features x Developing Interpretation "What happens after _____? Explain why this is an important step."	Practical/workplace RD-M-4.0.6. Scan to find key information Information RD-M-2.0.6. Scan to find key information Persuasion RD-M-3.0.6. Scan to find key information
Practical text—Key Organizing Features x Making Reader/Text Connections "When might you use these steps? Support your answer with evidence from the text."	Practical/workplace RD-M-4.0.8. Make predictions, draw conclusions, and make generalizations about what is read
Practical text—Key Organizing Features x Examining Content and Structure "Explain how the author organized this document. Use support from the text." Practical text—Key Organizing Features x Forming General Understanding "Tell what you need to complete the steps. Which features indicate this?"	Practical/workplace RD-M-4.0.13. Explain how organizational patterns and/or text features (e.g., pictures, charts, graphs, format) relate to the content of a practical/workplace passage
Practical text—Vocabulary x Developing Interpretation "Use the context to tell the meaning of _____."	Practical/workplace RD-M-4.0.3. Identify words that have multiple meanings and select the appropriate meaning for the context
Informational text—Supporting Ideas x Developing Interpretation "How does the author show you that the main idea is important?" Informational text—Supporting Ideas x Making Reader/Text Connections "Which details about the _____ help you to have a clear image of the topic? Explain why you chose them." Informational text—Supporting Ideas x Forming General Understanding "Identify ideas that most closely relate to the topic. Give evidence from the text to support your choice."	Persuasion RD-M-3.0.9. Reflect on and evaluate what is read Information RD-M-2.0.9. Reflect on and evaluate what is read
Informational text—Vocabulary x Making Reader/Text Connections "Explain the double meaning of _____. Tell which meaning better explains the major ideas in the passage."	Information RD-M-2.0.3. Identify words that have multiple meanings and select the appropriate meaning for the context Persuasion RD-M-3.0.3. Identify words that have multiple meanings and select the appropriate meaning for the context
Informational text—Vocabulary x Developing Interpretation	Information RD-M-2.0.8. Make predictions, draw conclusions, and make

"Which words do you think mean the same as the title? Tell why you think so." Informational text—Major Ideas x Developing Interpretation "How does the big idea in the first section relate to the big idea in the last section?"	generalizations about what is read Persuasion RD-M-3.0.8. Make predictions, draw conclusions, and make generalizations about what is read
Informational text—Major Ideas x Developing Interpretation "How does the big idea in the first section relate to the big idea in the last section?"	Information RD-M-2.0.7. Skim to get the general meaning of a passage Persuasion RD-M-3.0.7. Skim to get the general meaning of a passage
Informational text—Central Purpose x Examining Content and Structure "Based on what you read, what might be the reason the author wrote this?"	Information RD-M-2.0.1. Identify an author's purpose in informational materials
Informational text—Central Purpose x Developing Interpretation "How does the author support the message?"	Information RD-M-2.0.13. Identify supporting details and explain their importance in a passage
Informational text—Major Ideas x Forming General Understanding "Give a summary of the major ideas." Literary text—Major Events x Forming General Understanding "Write a short summary of the major events in the story."	Information RD-M-2.0.14. Summarize information from a passage
Informational text—Adjunct Aids x Forming General Understanding "The chart in this article is mostly used to _____?" Informational text—Adjunct Aids X Developing Interpretation "How does the information in the chart support the information in the article?" Informational text—Adjunct Aids x Examining Content and Structure "What is the significance of the map to the article? Explain." Informational text—Major Ideas x Examining Content and Structure "What did the author do to present information clearly?" Informational text—Adjunct Aids x Making Reader/Text Connections "Why did the author include the picture with the chart? Explain using what you know and information from the text." Practical text—Key Graphics x Examining Content and Structure "Why is there boldface print at the front of each section?"	Information RD-M-2.0.11. Use text features (e.g., lists, charts, graphs, tables of contents, captions, diagrams, headings) to understand a passage
Informational text—Vocabulary x Examining Content and Structure "Why did the author give a definition of _____ in paragraph 2?"	Practical/workplace RD-M-4.0.14. Interpret the meaning of specialized vocabulary
Practical text—Vocabulary x Forming General Understanding	Practical/workplace RD-M-4.0.11. Locate and apply information for a specific

"Which words tell what the document is mostly about? Use evidence from the text to support your response." Practical text—Central Purpose x Developing Interpretation "Do these directions list all the materials you need? Give a reason for your answer."	purpose (e.g., following directions, completing a task)
Practical text—Central Purpose x Forming General Understanding "What is the purpose of the document? Use evidenced from the document in your response."	Practical/workplace RD-M-4.0.1. Identify an author's purpose in practical/workplace materials

Middle school reading—close/unsure match

NAEP standards	KCCT standards
Informational text—Central Purpose x Making Reader/Text Connections "Do you agree with the author's message? Give evidence from the text."	Persuasion RD-M-3.0.12. Identify an author's opinion about a subject
Practical text—Key Information x Making Reader/Text Connections "Compare the directions to a set of directions you have used in the past. Which set is easier to follow? Tell why."	Persuasion RD-M-3.0.10. Connect information from a passage to students' lives and/or real world issues Practical/workplace RD-M-4.0.10. Connect information from a passage to students' lives and/or real world issues
Practical text—Key Information x Examining Content and Structure "Name one step that is important in order to follow the directions. Explain why this step is important."	Practical/workplace RD-M-4.0.12. Identify the sequence of activities needed to carry out a procedure
Literary text—Vocabulary x Forming General Understanding "Which words describe what the story is mostly about? Use evidence from the text to support your response."	Literary 1.09. Reflect and evaluate
Practical text—Vocabulary x Examining Content and Structure "Why does the author use the words _____ to present the last step of the directions?" Practical text—Vocabulary X Making Reader/Text Connections "Explain why the phrase _____ is useful in these directions." Literary text—Vocabulary x Developing Interpretation "Which words let you know that time has gone by? Explain with evidence from the story."	Persuasion RD-M- 3.0.13. Apply knowledge of organizational patterns (e.g., cause and effect, comparison, contrast, sequence) to understand a passage

Middle school reading—no match

KCCT only
Persuasion RD-M-3.0.15. Identify the argument and supporting evidence
Practical/workplace RD-M-4.0.5. Formulate questions to guide reading
Information RD-M-2.0.5. Formulate questions to guide reading
Persuasion RD-M-3.0.5 Formulate questions to guide reading
Literature RD-M-1.0.5. Formulate questions to guide reading
Persuasion RD-M-3.0.16. Identify commonly used persuasive techniques (e.g., expert opinion, statistics, testimonial, bandwagon)
Persuasion RD-M-3.0.1. Identify an author's purpose in persuasive materials
Persuasion RD-M-3.0.11. Distinguish between informative and persuasive passages
Persuasion RD-M-3.0.14. Distinguish between fact and opinion
Persuasion RD-M-3.0.17. Identify bias and/or misinformation
Information RD-M-2.0.4. Know the meanings of common prefixes and suffixes to comprehend unfamiliar words
Persuasion RD-M-3.0.4. Know the meanings of common prefixes and suffixes to comprehend unfamiliar words
Practical/workplace RD-M-4.0.4. Know the meanings of common prefixes and suffixes to comprehend unfamiliar words
Literature RD-M-1.0.4. Know the meanings of common prefixes and suffixes to comprehend unfamiliar words
Literature RD-M-1.0.16. Identify devices such as foreshadowing, imagery, and figurative language (e.g., similes, metaphors, personification, hyperbole)
Practical/workplace RD-M-4.0.2. Use knowledge of synonyms, antonyms, and homonyms to comprehend a passage
Persuasion RD-M-3.0.2. Use knowledge of synonyms, antonyms, and homonyms to comprehend a passage
Information RD-M-2.0.2. Use knowledge of synonyms, antonyms, and homonyms to comprehend a passage
Literature RD-M-1.0.2. Use knowledge of synonyms, antonyms, and homonyms to comprehend a passage

Grade 5 math—exact matches

Algebraic thinking	
KCCT	NAEP
MA-E-4.1.1 Concepts—students will describe properties of, define, give examples of, and apply to both real world and mathematical situations: Functions (input-output) through pictures, tables, and words	Algebra and functions. Describe, extend, interpolate, transform, and create a wide variety of patterns and functional relationships—recognize patterns and sequences Number sense, properties, and operations. Use elementary number theory—describe number patterns *(assessed at simple level)*
MA-E-4.2.1 Skills—Students will perform mathematical operations and procedures accurately and efficiently, explain how the skills work in real-world or mathematical situations, and are able to: Find rules for, extend, and create patterns.	Number sense, properties, and operations. Use elementary number theory—describe number patterns *(assessed at simple level)* Algebra and functions. Describe, extend, interpolate, transform, and create a wide variety of patterns and functional relationships—extend a pattern or functional relationship Algebra and functions. Use mathematical reasoning—make conjectures Algebra and functions. Describe, extend, interpolate, transform, and create a wide variety of patterns and functional relationships—create an example of a pattern or functional relationship
MA-E-4.1.3 Concepts—Students will describe properties of, define, give examples of and apply to both real world and mathematical situations: A positive coordinate system of graphing using ordered pairs	Algebra and functions. Use number lines and rectangular coordinate systems as representational tools—identify or graph sets of points on a number line or in a rectangular coordinate system
MA-E-4.2.3 Skills—Students will perform mathematical operations and procedures accurately and efficiently, explain how the skills work in real-world or mathematical situations, and are able to: Find solutions to number sentences with a missing value (e.g., 7 + N + 10, N + 5 > 14)	Algebra and functions. Represent and describe solutions to linear equations and inequalities to solve mathematical and real world problems—provide solution sets of real numbers *(assessed at simple level)* Algebra and functions. Describe, extend, interpolate, transform, and create a wide variety of patterns and functional relationships—understand and apply the concept of a variable *(assessed at simple level)* Algebra and functions. Represent and describe solutions to linear equations and inequalities to solve mathematical and real world problems—provide solution sets of whole numbers
MA-E-4.2.4 Skills—Students will perform mathematical operations and	Number sense, properties, and operations. Represent numbers and operations

procedures accurately and efficiently, explain how the skills work in real-world or mathematical situations, and are able to: Locate whole numbers, fractions, and decimals on a number line	in a variety of equivalent forms using models, diagrams, and symbols—model numbers using number lines
MA-E-4.3.1 Relationships—Students will make connections between concepts and skills, show how connections are made, explain why procedures work, and/or make generalizations about mathematics by showing: How patterns (e.g., numbers, pictures, words) are alike and different	Algebra and functions. Use multiple representations for situations to translate among diagrams, models, and symbolic expressions. Algebra and functions. Use mathematical reasoning—use informal induction and deduction *(assessed at simple level)* Algebra and functions. Use mathematical reasoning—validate and justify conclusions and generalizations
MA-E-4.3.2 Relationships—Students will make connections between concepts and skills, show how connections are made, explain why procedures work, and/or make generalizations about mathematics by showing: How rules involving number patterns can be explained	Algebra and functions. Use mathematical reasoning—use informal induction and deduction *(assessed at simple level)* Algebra and functions. Use mathematical reasoning—validate and justify conclusions and generalizations
Number/computation	
MA-E-1.1.1. Concepts—Students will describe properties of, give examples of, and apply to real world or mathematical situations: Whole numbers (0 to 100,000,000), fractions, mixed numbers, and decimals through thousandths	Number sense, properties, and operations. Relate counting, grouping, and place value—use place value to model and describe whole numbers and decimals
MA-E-1.1.2 Concepts—Students will describe properties of, give examples of, and apply to real world or mathematical situations: The operations of addition, subtraction, multiplication, and division	Number sense, properties, and operations. Compute with numbers (that is, add, subtract, multiply, divide)—describe effect of operations on size and order of numbers Number sense, properties, and operations. Compute with numbers (that is, add, subtract, multiply, divide)—apply basic properties of operations
MA-E-1.1.3 Concepts—Students will describe properties of, give examples of, and apply to real world or mathematical situations: Odd and even numbers, composite and prime numbers, multiples, and factors	Number sense, properties, and operations. Use elementary number theory—describe odd and even numbers and their characteristics
MA-E-1.1.4 Concepts—Students will describe properties of, give examples of, and apply to real world or mathematical situations: Place value, expanded form, number magnitude (order, compare) to 100,000,000 and decimals through thousandths	Number sense, properties, and operations. Relate counting, grouping, and place value—use place value to model and describe whole numbers and decimals Number sense, properties, and operations. Use computation and estimation in applications—make estimates appropriate to a given situation—Describe order of magnitude (estimation related to place value, scientific notation)
MA-E-1.1.5 Concepts—Students will describe properties of, give examples of, and apply to real world or mathematical situations: Multiple representations of numbers (e.g., drawings, manipulatives, symbols)	Number sense, properties, and operations. Represent numbers and operations in a variety of equivalent forms using models, diagrams, and symbols—use two- and three-dimensional region models to describe numbers Number sense, properties, and operations. Represent numbers and operations

	in a variety of equivalent forms using models, diagrams, and symbols—use other models appropriate to a given situation (for example, draw diagrams to represent a number or an operation; write a number sentence to fit a situation or describe a situation to fit a number sentence; interpret calculator or computer displays) Number sense, properties, and operations. Represent numbers and operations in a variety of equivalent forms using models, diagrams, and symbols—model numbers using set models such as counters
MA-E-1.2.1 Skills—Students will perform mathematical operations and procedures accurately and efficiently, explain how the skills work in real world or mathematical situations, and are able to: Read, write, and rename whole numbers	Number sense, properties, and operations. Represent numbers and operations in a variety of equivalent forms using models, diagrams, and symbols—read, write, rename, order, and compare numbers
MA-E-1.2.2 Skills—Students will perform mathematical operations and procedures accurately and efficiently, explain how the skills work in real world or mathematical situations, and are able to: Add, subtract, multiply, and divide whole numbers using a variety of methods (e.g., mental, paper and pencil, calculator)	Number sense, properties, and operations. Compute with numbers (that is, add, subtract, multiply, divide)—select appropriate computation method (such as pencil and paper, calculator, mental arithmetic) Number sense, properties, and operations. Use computation and estimation in applications—solve application problems involving answers or estimates as appropriate Number sense, properties, and operations. Use computation and estimation in applications—verify solutions and determine the reasonableness of results—in real-world situations
MA-E-1.2.6 Skills—Students will perform mathematical operations and procedures accurately and efficiently, explain how the skills work in real world or mathematical situations, and are able to: Estimate computational results using an appropriate strategy	Number sense, properties, and operations. Use computation and estimation in applications—round whole numbers, decimals, and fractions in meaningful contexts Number sense, properties, and operations. Use computation and estimation in applications—make estimates appropriate to a given situation—know when to estimate Number sense, properties, and operations. Use computation and estimation in applications—make estimates appropriate to a given situation—select appropriate type of estimate (overestimate, underestimate, range of estimate) Number sense, properties, and operations. Use computation and estimation in applications—select appropriate method of estimation (such as front end, rounding)
Geometry/Measurement	

MA-E-2.1.2. Concepts—Students will describe properties of, define, give examples of, and apply to both real world and mathematical situations: Basic two-dimensional shapes including circles, triangles (right, equilateral), all quadrilaterals, pentagons, hexagons, and octagons	Geometry and spatial sense: Describe, visualize, draw, and construct geometric figures—draw or sketch a figure given a verbal description (open-ended items)
MA-E-2.1.3. Concepts—Students will describe properties of, define, give examples of, and apply to both real world and mathematical situations: Basic three-dimensional shapes including spheres, cones, cylinders, pyramids, cubes, and triangular and rectangular prisms	Geometry and spatial sense: Describe, visualize, draw, and construct geometric figures—draw or sketch a figure given a verbal description (open-ended items)
MA-E-2.1.5. Concepts—Students will describe properties of, define, give examples of, and apply to both real world and mathematical situations: Nonstandard and standard (US Customary, metric) units of measurement	Measurement—Select and use appropriate units of measurement according to: type of unit Measurement—Select and use appropriate units of measurement according to: size of unit
MA-E-2.2.3. Skills—Students will perform mathematical operations and procedures accurately and efficiently, explain how the skills work in real world or mathematical situations, and are able to: Identify and draw basic two-dimensional shapes in different orientations using rotations (turns), reflections (flips), and translations (slides) MA-E-2.3.4. Relationships—Students will make connections between concepts and skills, explain how connections are made, explain why procedures work, and/or make generalizations about mathematics by showing: How lines of symmetry relate to shapes	Geometry and spatial sense—Identify the relationship (congruence, similarity) between a figure and its image under a transformation—use motion geometry (informal: lines of symmetry, flips, turns, slides)
MA-E-2.2.5. Skills—Students will perform mathematical operations and procedures accurately and efficiently, explain how the skills work in real world or mathematical situations, and are able to: Use nonstandard and standard units to measure weight, length, perimeter, area (figures that can be divided into rectangular shapes), and angles	Measurement—Estimate, calculate (using basic principles or formulas), or compare perimeter, area, volume, and surface area in meaningful contexts to solve mathematical and real world problems—solve problems involving perimeter and area (such as triangles, quadrilaterals, other polygons, circles, combined forms) [Note: Grade 4 tasks use manipulatives] *(assessed at simple level)* Measurement—Select appropriate methods of measurement (such as direct or indirect)
MA-E-2.2.6. Skills—Students will perform mathematical operations and procedures accurately and efficiently, explain how the skills work in real world or mathematical situations, and are able to: Use standard units to measure volume of rectangular prisms, liquid capacity, money, time, and temperature (e.g., above and below zero)	Measurement—Select appropriate methods of measurement (such as direct or indirect) Measurement—Estimate, calculate (using basic principles or formulas), or compare perimeter, area, volume, and surface area in meaningful contexts to solve mathematical and real world problems—solve problems involving volume and surface area (such as rectangular solids, cylinders, cones, pyramids, prisms, combined forms) (Grade 4 uses manipulatives) *(assessed at*

	simple level)
MA-E-2.2.7. Skills—Students will perform mathematical operations and procedures accurately and efficiently, explain how the skills work in real world or mathematical situations, and are able to: Choose appropriate tools (e.g., protractors, meter sticks, rulers) for specific measurement tasks	Measurement—Select and use appropriate measurement instruments (for example, manipulatives such as ruler, meter stick, protractor, thermometer, scales for weight or mass, gauges)
MA-E-2.2.8. Skills—Students will perform mathematical operations and procedures accurately and efficiently, explain how the skills work in real world or mathematical situations, and are able to: Identify measurable attributes of an object and make an estimate using appropriate units of measurement	Measurement—Estimate the size of an object or compare objects with respect to a given attribute (such as length, area, capacity, volume, weight/mass)
MA-E-2.3.1. Relationships—Students will make connections between concepts and skills, explain how connections are made, explain why procedures work, and/or make generalizations about mathematics by showing: How two-dimensional shapes are alike or different	Geometry and spatial sense—Investigate and predict results of combining, subdividing, and changing shapes (such as paper folding, dissecting, tiling, rearranging pieces of solids Geometry and spatial sense—Represent problem situations with geometric models and apply properties of figures in meaningful contexts to solve mathematical and real world problems Geometry and spatial sense—Establish and explain relationships involving geometric concepts—make conjectures Geometry and spatial sense—Establish and explain relationships involving geometric concepts—use informal induction and deduction *(assessed at simple level)* Geometry and spatial sense—Establish and explain relationships involving geometric concepts—validate and justify conclusions and generalizations
MA-E-2.3.2. Relationships—Students will make connections between concepts and skills, explain how connections are made, explain why procedures work, and/or make generalizations about mathematics by showing: How three-dimensional shapes are alike or different	Geometry and spatial sense—Represent problem situations with geometric models and apply properties of figures in meaningful contexts to solve mathematical and real world problems Geometry and spatial sense—Establish and explain relationships involving geometric concepts—make conjectures Geometry and spatial sense—Establish and explain relationships involving geometric concepts—use informal induction and deduction *(assessed at simple level)* Geometry and spatial sense—Establish and explain relationships involving geometric concepts—validate and justify conclusions and generalizations
MA-E-3.1.1. Concepts—Students will describe properties of, define, give	Data analysis, statistics, and probability—Describe measures of central

examples of, and apply to both real world and mathematical situations: Mean, median, mode, and range of a set of data	tendency and dispersion in real world situations *(assessed at simple level)* Data analysis, statistics, and probability—Understand and reason about the use and misuse of statistics in our society—appropriately apply statistics to real world situations *(assessed at simple level)*
MA-E-3.1.3. Concepts—Students will describe properties of, define, give examples of, and apply to both real world and mathematical situations: The process of using data to answer questions (e.g., pose a question, plan, collect data, organize and display data, interpret data to answer questions)	Data analysis, statistics, and probability—Understand and reason about the use and misuse of statistics in our society—appropriately apply statistics to real world situations *(assessed at simple level)*
MA-E-3.1.2 Concepts—Students will describe properties of, define, give examples of, and apply to both real world and mathematical situations: Probability of an unlikely event (near zero) and likely event (near one)	Data analysis, statistics, and probability—Determine the probability of a simple event—use sample spaces and the definition of probability to describe events
MA-E-3.2.7. Skills—Students will perform mathematical operations and procedures accurately and efficiently, explain how the skills work in real world or mathematical situations, and are able to: Generate all possible outcomes sin simple probability activities	Data analysis, statistics, and probability—Determine the probability of a simple event—use sample spaces and the definition of probability to describe events Data analysis, statistics, and probability—Apply the basic concept of probability to real world situations—use probabilistic thinking informally
MA-E-3.2.8. Skills—Students will perform mathematical operations and procedures accurately and efficiently, explain how the skills work in real world or mathematical situations, and are able to: Determine the fairness of games using simple probability activities	Data analysis, statistics, and probability—Apply the basic concept of probability to real world situations—use probabilistic thinking informally
MA-E-3.2.3. Skills—Students will perform mathematical operations and procedures accurately and efficiently, explain how the skills work in real world or mathematical situations, and are able to: Construct and interpret displays of data (e.g., line graph, bar graph, pictograph, line plot, simple Venn diagram, table)	Data analysis, statistics, and probability—Organize and display data and make inferences—use tables, histograms (bar graphs), pictograms, and line graphs
MA-E-3.2.5. Skills—Students will perform mathematical operations and procedures accurately and efficiently, explain how the skills work in real world or mathematical situations, and are able to: Make predictions and draw conclusions based on data	Data analysis, statistics, and probability—Organize and display data and make inferences—use tables, histograms (bar graphs), pictograms, and line graphs Data analysis, statistics, and probability—Read, interpret, and make predictions using tables and graphs—solve problems by estimating and computing with data Data analysis, statistics, and probability—Read, interpret, and make predictions using tables and graphs—read and interpret data
MA-E-3.2.2. Skills—Students will perform mathematical operations and procedures accurately and efficiently, explain how the skills work in real world or mathematical situations, and are able to: Collect, organize, and describe data (e.g., drawings, tables, charts)	Data analysis, statistics, and probability—Organize and display data and make inferences—use tables, histograms (bar graphs), pictograms, and line graphs Data analysis, statistics, and probability—Read, interpret, and make

	predictions using tables and graphs—read and interpret data

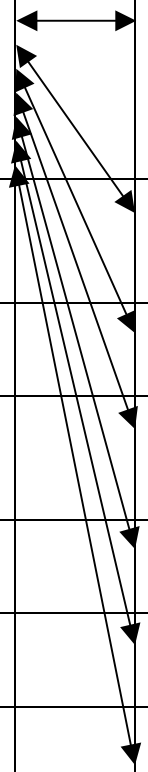
No matches—Gr 5 math

MA-E-4.2.5 Skills—Students will perform mathematical operations and procedures accurately and efficiently, explain how the skills work in real-world or mathematical situations, and are able to: Graph ordered pairs on a positive coordinate grid
MA-E- 4.2.2 Skills—Students will perform mathematical operations and procedures accurately and efficiently, explain how the skills work in real-world or mathematical situations, and are able to: Create tables to analyze patterns/functions
MA-E-4.1.2 Concepts—Students will describe properties of, define, give examples of, and apply to real world and mathematical situations: Number sentences with a missing value or variable
MA-E-1.2.3 Skills—Students will perform mathematical operations and procedures accurately and efficiently, explain how the skills work in real world or mathematical situations and are able to: Add and subtract fractions with like denominators; ad and subtract decimals through hundredths
MA-E-1.2.4 Skills—Students will perform mathematical operations and procedures accurately and efficiently, explain how the skills work in real world or mathematical situations and are able to: Skip-count forward and backward
MA-E-1.2.5 Skills—Students will perform mathematical operations and procedures accurately and efficiently, explain how the skills work in real world or mathematical situations and are able to: Estimate quantities of objects
MA-E-1.2.7 Skills—Students will perform mathematical operations and procedures accurately and efficiently, explain how the skills work in real world or mathematical situations and are able to: Use factors to determine prime and composite numbers
MA-E-1.2.8 Skills—Students will perform mathematical operations and procedures accurately and efficiently, explain how the skills work in real world or mathematical situations and are able to: Determine least common multiple (LCM)
MA-E-1.2.9 Skills—Students will perform mathematical operations and procedures accurately and efficiently, explain how the skills work in real world or mathematical situations and are able to: Order and compare (>, <, =) whole numbers and fractions
MA-E-1.3.1 Relationships—Students will make connections between concepts and skills, show how connections are made, explain why procedures work, and/or make generalizations about mathematics in meaningful ways by

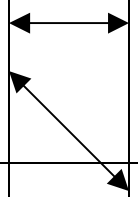
showing: How fractions, decimals, and whole numbers relate (equivalence, order)
MA-E-1.3.2 Relationships—Students will make connections between concepts and skills, show how connections are made, explain why procedures work, and/or make generalizations about mathematics in meaningful ways by showing: How properties (commutative, associative, identity properties of addition and multiplication, zero property of multiplication) are used in computation
MA-E-1.3.3 Relationships—Students will make connections between concepts and skills, show how connections are made, explain why procedures work, and/or make generalizations about mathematics in meaningful ways by showing: How the base 10 number system related to place value (e.g., ten tens make one hundred, ten hundredths make one-tenth)
MA-E-2.1.1. Concepts—Students will describe properties of, define, give examples of, and apply to both real world and mathematical situations: Basic geometric elements and terms including points, rays, lines (perpendicular, parallel, intersecting), segments, sides, edges, faces, vertices, radius, diameter, and angles (acute, right, obtuse)
MA-E-2.1.4. Concepts—Students will describe properties of, define, give examples of, and apply to both real world and mathematical situations: Symmetry, congruence, and similar figures
MA-E-2.2.1. Skills—Students will perform mathematical operations and procedures accurately and efficiently, explain how the skills work in real world or mathematical situations and are able to: Sort objects and compare attributes
MA-E-2.2.2. Skills—Students will perform mathematical operations and procedures accurately and efficiently, explain how the skills work in real world or mathematical situations and are able to: Use symmetry to construct a geometric design
MA-E-2.2.4. Skills—Students will perform mathematical operations and procedures accurately and efficiently, explain how the skills work in real world or mathematical situations and are able to: Identify basic three-dimensional shapes by appearance
MA-E-2.2.9. Skills—Students will perform mathematical operations and procedures accurately and efficiently, explain how the skills work in real world or mathematical situations and are able to: Use measurements to describe and compare attributes of objects
MA-E-2.3.3. Relationships—Students will make connections between concepts and skills, show how connections are made, explain why procedures work, and/or make generalizations about mathematics in meaningful ways by showing: How units within the same measurement system (US Customary or

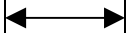
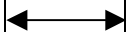
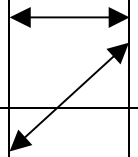
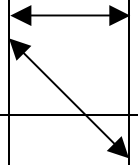
metric) are related
MA-E-3.2.1. Skills—Students will perform mathematical operations and procedures accurately and efficiently, explain how the skills work in real world or mathematical situations and are able to: Pose questions that can be answered by collecting data
MA-E-3.2.6. Skills—Students will perform mathematical operations and procedures accurately and efficiently, explain how the skills work in real world or mathematical situations and are able to: Find mean, median, mode, and range of a set of data
MA-E-3.2.4. Skills—Students will perform mathematical operations and procedures accurately and efficiently, explain how the skills work in real world or mathematical situations and are able to: Interpret circle graphs
MA-E- 3.3.1. Relationships—Students will make connections between concepts and skills, show how connections are made, explain why procedures work, and/or make generalizations about mathematics in meaningful ways by showing: How data are used to draw conclusions
MA-E-3.3.2. Relationships—Students will make connections between concepts and skills, show how connections are made, explain why procedures work, and/or make generalizations about mathematics in meaningful ways by showing: How predictions can be based on probability data
MA-E-3.3.3. Relationships—Students will make connections between concepts and skills, show how connections are made, explain why procedures work, and/or make generalizations about mathematics in meaningful ways by showing: How the type of display is related to data (appropriateness of graphs)

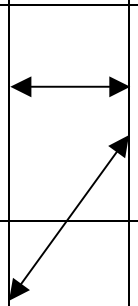
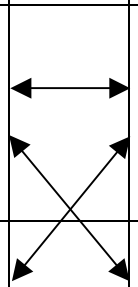
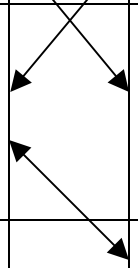
KCCT and NAEP Framework Exact Matches		
KCCT Framework		**NAEP Framework**
Number/computation **Concepts**—Students will describe properties of, define, give examples of, and/or apply to both real-world and mathematical situation. **MA-M-1.1.4** – Place value of whole numbers and decimals.	↔	**Number sense, properties, and operations** 1. Relate counting, grouping, and place value—use place value to model and describe whole numbers and decimals.
Number/computation **Concepts**— Students will describe properties of, define, give examples of, and/or apply to both real-world and mathematical situation. **MA-M-1.1.6** – Representation of numbers and operations in a variety of equivalent forms using models, diagrams, and symbols (e.g., number lines, 10 by 10 grids, rectangular arrays, number sentences)	↔	**Number sense, properties, and operations** 2. Represent numbers and operations in a variety of equivalent forms using models, diagrams, and symbols—model numbers using number lines.
Algebraic ideas **Skills**—Students will perform the following mathematical operations and/or procedures accurately and efficiently, and explain how they work in real-world and mathematical situations; **MA-M-4.2.6** – Write and solve equations that represent everyday situations.	↘ ↔	**Number sense, properties, and operations** 2. Represent numbers and operations in a variety of equivalent forms using models, diagrams, and symbols—use other models appropriate to a given situation (for example, draw diagrams to represent a number or an operation; write a number sentence to fit a situation or describe a situation to fit a number sentence; interpret calculator or computer displays).
Number/computation **Relationships**—Students will show connections and how connections are made between concepts and skills, explain why procedures work, and make generalizations about mathematics in meaningful ways for the following relationships: **MA-M-1.3.1** – How whole numbers, natural numbers, integers	↔	**Number sense, properties, and operations** 2. Represent numbers and operations in a variety of equivalent forms using models, diagrams, and symbols—read, write, rename, order, and compare numbers.
Number/computation **Skills**—Students will perform the following mathematical operations and/or procedures accurately and efficiently, and explain how they work in real-world and mathematic situations: **MA-M-1.2.1** Add, subtract, multiply, and divide rational numbers (fractions, decimals, percents, integers) to solve problems.	↔	**Number sense, properties, and operations** Compute with numbers (that is, add, subtract, multiply, divide)—apply basic properties of operations.

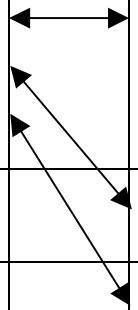
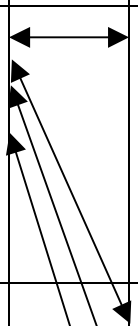
KCCT Framework		NAEP Framework
Number/computation **Skills**—Students will perform the following mathematical operations and/or procedures accurately and efficiently, and explain how they work in real-world and mathematic situation: **MA-M-1.2.2** Compute (e.g., estimate, use pencil and paper, use calculator, round, use mental math) large and small quantities and check for reasonable and appropriate computational results.		**Number sense, properties, and operations** Use computation and estimation in applications—round whole numbers, decimals, and fractions in meaningful contexts.
		Number sense, properties, and operations Compute with numbers (that is, add, subtract, multiply, divide)—select appropriate computation method (such as pencil and paper, calculator, mental arithmetic).
		Number sense, properties, and operations Use computation and estimation in applications—make estimates appropriate to a given situation—know when to estimate
		Number sense, properties, and operations Use computation and estimation in applications—make estimates appropriate to a given situation—select appropriate type of estimate (overestimate, underestimate, range of estimate)
		Number sense, properties, and operations Use computation and estimation in applications—select appropriate method of estimation (such as front end rounding
		Number sense, properties, and operations Use computation and estimation in applications—solve application problems involving answers or estimates as appropriate
		Number sense, properties, and operations Use computation and estimation in applications—verify solutions and determine the reasonableness of results—in real-world situations

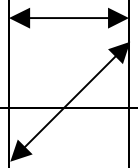
KCCT Framework		NAEP Framework
Number/computation **Skills**—Students will perform the following mathematical operations and/or procedures accurately and efficiently, and explain how they work in real-world and mathematic situation: **MA-M-1.2.3** Apply ratios, proportional reasoning, and percents (e.g., constant rate of change, unit pricing)		**Number sense, properties, and operations** Apply ratios and proportional thinking in a variety of situations—use proportions to model problems
		Number sense, properties, and operations Apply rations and proportional thinking in a variety of situations—use rations to describe situations
		Number sense, properties, and operations Apply ratios and proportional thinking in a variety of situations—use proportional thinking to solve problems (including rates, scaling, and similarity)
		Number sense, properties, and operations Apply ratios and proportional thinking in a variety of situations—understand the meaning of percentage)including percentages greater than 100 and less than 1)
		Number sense, properties, and operations Apply ratios and proportional thinking in a variety of situations—solve problems involving percentages
Number/computation **Skills**—Students will perform the following mathematical operations and/or procedures accurately and efficiently, and explain how they work in real-world and mathematic situation: **MA-M-1.2.4** Identify and use number theory concepts [prime numbers, prime factorization, composite numbers, factors, multiples, divisibility, greatest common factor (GCF), least common multiple (LCM)] to solve problems.		**Number sense, properties, and operations** Use elementary number theory—describe prime numbers
		Number sense, properties, and operations Use elementary number theory—use factors and multiples to model and solve problems

KCCT Framework		NAEP Framework
Geometry/measurement **Skills**—Students will perform the following mathematical operations and/or procedures accurately and efficiently and explain how they work in real-world and mathematical situations: **MA-M-2.2.5** Use formulas to find area and perimeter of triangles and quadrilaterals, area and circumference of circles, and surface area and volume of rectangular prisms		**Measurement** Estimate, calculate (using basic principles or formulas), or compare perimeter, area, volume, and surface are in meaningful contexts to solve mathematical and real-world problems—solve problems involving perimeter and area (such as triangles, quadrilaterals, other polygons, circles, combined forms).
Geometry/measurement **Relationships**—Students show connections and how connections are made between concepts and skills, explain why procedures work, and make generalizations about mathematics in meaningful ways for the following relationships: **MA-M-2.3.3** How proportional figures are related (scale drawings, similar figures)		**Measurement** Make and read scale drawings
Geometry/measurement **Relationships**—Students show connections and how connections are made between concepts and skills, explain why procedures work, and make generalizations about mathematics in meaningful ways for the following relationships: **MA-M-2.3.1** How measurements and measurement formulas are related or different (perimeter and area; rate, time, and distance; circumference and are of a circle)		**Measurement** Apply the concept of rate to measurement situations.
Geometry/measurement **Concepts**—Students will describe properties of, define, give examples of, and/or apply to both real-world and mathematical situations: **MA-M-2.1.2** Two dimensional shapes including circles, regular polygons quadrilaterals (square, rectangle, rhombus parallelogram, trapezoid), and triangles (acute, obtuse, right, equilateral, scalene, isosceles)		**Geometry and spatial sense** Describe, visualize, draw, and construct geometric figures—draw or sketch a figure given a verbal description (open-ended items)
		Geometry and spatial sense Describe, visualize, draw, and construct geometric figures—given a figure, write a verbal description of its geometric qualities.

KCCT Framework		NAEP Framework
Geometry/measurement **Skills**—Students will perform the following mathematical operations and/or procedures accurately and efficiently and explain how they work in real-world and mathematical situations: **MA-M-2.2.2** Use appropriate tools and strategies (e.g., combining and subdividing shapes) to find measures of both regular and irregular shapes.		**Geometry and spatial sense** Investigate and predict results of combining, subdividing, and changing shapes (such as paper folding, dissecting, tiling, rearranging pieces of solids.
Geometry/measurement **Skills**—Students will perform the following mathematical operations and/or procedures accurately and efficiently and explain how they work in real-world and mathematical situations: **MA-M-2.2.3.** Move shapes in a coordinate plane: translate (slide, rotate (turn), reflect (flip), and dilate (magnify, reduce)		**GEOMETRY AND SPATIAL SENSE** Identify the relationship (congruence, similarity) between a figure and its image under a transformation—use motion geometry (informal: lines of symmetry, flips, turns, slides).
Geometry/measurement **Concepts**—Students will describe properties of, define, give examples of, and/or apply to both real-world and mathematical situations: **MA-M-2.1.4** Congruence, symmetry, and similarity		**Geometry and spatial sense** Classify figures in terms of congruence and similarity, and informally apply these relationships using proportional reasoning where appropriate.
Geometry/measurement **Relationships**—Students show connections and how connections are made between concepts and skills, explain why procedures work, and make generalizations about mathematics in meaningful ways for the following relationships: **MA-M-2.3.3** How proportional figures are related (scale drawings, similar figures		**Geometry and spatial sense** Apply geometric properties and relationships in solving problems—apply properties of ratio and proportion with respect to similarity (assessed at simple level)
Geometry/measurement **Skills**—Students will perform the following mathematical operations and/or procedures accurately and efficiently and explain how they work in real-world and mathematical situations: **MA-M-2.2.6** Estimate and determine measurement of angles		**Measurement** Estimate the size of an object or compare objects with respect to a given attribute (such as length, area, capacity, volume, weight/mass)
		Measurement Select and use appropriate measurement instruments (for example, manipulatives such as ruler, meter stick, protractor, thermometer, scales for weight or mass, gauges)

KCCT Framework		NAEP Framework
Probability/statistics **Relationships**—Students will show connections and how connections are made between concepts and skills, explain why procedures work, and make generalizations about mathematics in meaningful ways for the following relationships: **MA-M-3.3.1** How different representations of data (e.g., tables, graphs, diagrams, plots) are related		**Data analysis, statistics, and probability** Read, interpret, and make predictions using tables and graphs—read and interpret data
Probability/statistics **Skills**—Students will perform the following mathematical operations and/or procedures accurately and efficiently, explain how they work in real-world and mathematical situations: **MA-M-3.2.1** Organize, represent, analyze, and interpret sets of data		
Probability/statistics **Relationships**—Students will show connections and how connections are made between concepts and skills, explain why procedures work, and make generalizations about mathematics in meaningful ways for the following relationships: **MA-M-3.3.4** How probability and statistics are used to make predictions and/or draw conclusions		**Data analysis, statistics, and probability** Read, interpret, and make predictions using tables and graphs—solve problems by estimating and computing with data
Probability/statistics **Skills**—Students will perform the following mathematical operations and/or procedures accurately and efficiently, explain how they work in real-world and mathematical situations: **MA-M-3.2.5** Make predictions and draw conclusions from statistical data and probability		**Data analysis, statistics, and probability** Apply the basic concept of probability to real world situations—use probabilistic thinking informally
Probability/statistics **Relationships**—Students will show connections and how connections are made between concepts and skills, explain why procedures work, and make generalizations about mathematics in meaningful ways for the following relationships: **MA-M-3.3.2** How theoretical probability and experimental probability are related.		**Data analysis, statistics, and probability** Understand and apply sampling, randomness, and bias in data collection—make generalizations based on sample results
		Data analysis, statistics, and probability Determine the probability of a simple event—describe and make predictions about expected outcomes

KCCT Framework		NAEP Framework
Probability/statistics **Skills**—Students will perform the following mathematical operations and/or procedures accurately and efficiently, explain how they work in real-world and mathematical situations: **MA-M-3.2.2** Constrict and interpret displays of data (e.g., table, circle graph, line plot, stem-and-leaf plot, box-and-whiskers plot)		**Data analysis, statistics, and probability** Organize and display data and make inferences—use tables, histograms (bar graphs), pictograms, and line graphs
		Data analysis, statistics, and probability Organize and display data and make inferences—use circle graphs and scattergrams
		Data data analysis, statistics, and probability Organize and display data and make inferences—use stem-and-leaf plots and box-and-whisker plots
Probability/statistics **Skills**—Students will perform the following mathematical operations and/or procedures accurately and efficiently, explain how they work in real-world and mathematical situations: **MA-M-3.2.3** Find mean, median, mode, and range; recognize outliers, gaps, and clusters of data		**Data analysis, statistics, and probability** Organize and display data and make inferences—make decisions about outliers
Probability/statistics **Relationships**—Students will show connections and how connections are made between concepts and skills, explain why procedures work, and make generalizations about mathematics in meaningful ways for the following relationships: **MA-M-3.3.3** How data gathering, bias issues, faulty data analysis, and misleading representations affect interpretations and conclusions about data (e.g., changing the scale on a graph, polling only a specific group of people, using limited or extremely small sample size)		**Data analysis, statistics, and probability** Understand and reason about the use and misuse of statistics in our society –given certain situations and reported results, identify faulty arguments or misleading presentations of the data
		Data analysis, statistics, and probability Understand and apply sampling, randomness, and bias in data collection—given a situation, identify sources of sampling error
		Data analysis, statistics, and probability Understand and apply sampling, randomness, and bias in data collection—describe a procedure for selecting an unbiased sample
		Data analysis, statistics, and probability Understand and reason about the use and misuse of statistics in our society—appropriately apply statistics to real world situations.

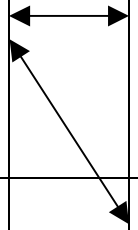
KCCT Framework		NAEP Framework
Probability/statistics **Concepts**—Students will describe properties of, define, give examples of, and/or apply to both real-world and mathematical situations: **MA-M-3.1.1** Meaning of central tendency (mean, median, mode)		**Data analysis, statistics, and probability** Describe measures of central tendency and dispersion in real world situations
Probability/statistics **Concepts**—Students will describe properties of, define, give examples of, and/or apply to both real-world and mathematical situations: **MA-M-3.1.2** Meaning of dispersion (range, cluster, gaps, outliers)		
Probability/statistics **Skills**—Students will perform the following mathematical operations and/or procedures accurately and efficiently, and explain how they work in real-world and mathematical situations: **MA-M-3.2.4** Calculate theoretical probabilities and tabulate experimental results from simulations		**Data analysis, statistics, and probability** Determine the probability of a simple event—estimate probabilities by use of simulations

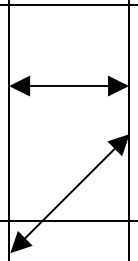
KCCT Framework		NAEP Framework
Algebraic ideas **Concepts**—Students will describe properties of, define, give examples of, and/or apply to both real-world and mathematical situations: **MA-M-4.1.2** Functions (e.g., the relationship between time and cost of some long distance phone calls, y +2x + 1) through tables, graphs, verbal rules, and algebraic notations		**Algebra and functions** Describe, extend, interpolate, transform, and create a wide variety of patterns and functional relationships—recognize patterns and sequences
Algebraic ideas **Skills**—Students will perform the following mathematical operations and/or procedures accurately and efficiently, and explain how they work in real-world and mathematical situations: **MA-M-4.2.4** Use variables to describe numerical patterns		**Algebra and functions** Describe, extend, interpolate, transform, and create a wide variety of patterns and functional relationships—understand and apply the concept of a variable
		Algebra and functions Describe, extend, interpolate, transform, and create a wide variety of patterns and functional relationships—extend a pattern or functional relationship
Algebraic ideas **Skills**—Students will perform the following mathematical operations and/or procedures accurately and efficiently, and explain how they work in real-world and mathematical situations: **MA-M-4.2.5** Represent and use functions through tables, graphs, verbal rules, and equations		**Algebra and functions** Describe, extend, interpolate, transform, and create a wide variety of patterns and functional relationships—given a verbal description, extend or interpolate with a pattern (complete a missing term)
		Algebra and functions Apply function concepts to model and deal with real world situations (assessed at simple level)
		Algebra and functions Describe, extend, interpolate, transform, and create a wide variety of patterns and functional relationships—translate patterns from one context to another
Algebraic ideas **Skills**—Students will perform the following mathematical operations and/or procedures accurately and efficiently, and explain how they work in real-world and mathematical situations: **MA-M-4.2.2** Solve simple equations and inequalities		**Algebra and functions** Represent and describe solutions to linear equations and inequalities to solve mathematical and real world problems—provide solution sets of whole numbers
		Algebra and functions Represent and describe solutions to linear equations and inequalities to solve mathematical and real world problems—provide solution sets of real numbers

KCCT Framework		NAEP Framework
Algebraic ideas **Relationships**—Students will show connections and how connections are made between concepts and skills, explain why procedure **MA-M-4.3.1** How everyday situations, tables, graphs, patterns, verbal rules, and equations relate to each other	↔	**Algebra and functions** Use multiple representations for situations to translate among diagrams, models, and symbolic expressions
	↘	**Algebra and functions** Describe, extend, interpolate, transform, and create a wide variety of patterns and functional relationships—create an example of a pattern or functional relationship
	↘	**Algebra and functions** Interpret contextual situations and perform algebraic operations on real numbers and algebraic expressions to solve mathematical and real world problems—use equivalent forms to solve problems
Algebraic ideas **Skills**—Students will perform the following mathematical operations and/or procedures accurately and efficiently, and explain how they work in real-world and mathematical situations: **MA-M-4.2.3** Model equations and inequalities (e.g., algebra tiles or blocks), pictorially (e.g., graphs, tables), and abstractly (e.g., equations	↔	**Algebra and functions** Use number lines and rectangular coordinate systems as representational tools—identify or graph sets of points on a number line or in a rectangular coordinate system
	↘	**Algebra and functions** Use number lines and rectangular coordinate systems as representational tools—work with applications using coordinates
Algebraic ideas **Skills**—Students will perform the following mathematical operations and/or procedures accurately and efficiently, and explain how they work in real-world and mathematical situations: **MA-M-4.2.1** Simplify numerical and algebraic expressions	↔	**Algebra and functions** Interpret contextual situations and perform algebraic operations on real numbers and algebraic expressions to solve mathematical and real world problems—solve problems involving substitution in expressions and formulas
	↘	**Algebra and functions** Interpret contextual situations and perform algebraic operations on real numbers and algebraic expressions to solve mathematical and real words problems—solve meaningful problems involving a formula with one variable

KCCT-NAEP Standards Partial Matches

KCCT Framework		NAEP Framework
Number/computation **Concepts**—Students will describe properties of, define, give examples of, and/or apply to both real-world and mathematical situations: **MA-M-1.1.6** Representation of numbers and operations in a variety of equivalent forms using models, diagrams, and symbols (e.g., number lines, 10 by 10 grids, rectangular arrays, number sentences)	↔	**Number sense, properties, and operations** 2. Represent numbers and operations in a variety of equivalent forms using models, diagrams, and symbols—use two- and three-dimensional region models to describe numbers
Number/computation **Relationships**—Students will show connections and how connections are made between concepts and skills, explain why procedures work, and make generalizations about mathematics in meaningful ways for the following relationships: **MA-M-1.3.3** How operations (addition and subtraction; multiplication and division; squaring and taking the square root of a number) are inversely related.	↔	**Number sense, properties, and operations** Compute with numbers (that is, add, subtract, multiply, divide)—describe effect of operations on size and order of numbers
Number/computation **Relationships**—Students will show connections and how connections are made between concepts and skills, explain why procedures work, and make generalizations about mathematics in meaningful ways for the following relationships: **MA-M-1.3.2** How properties such as commutative, associative, distributive, and identities show relationships among operations and may be used to justify steps in solving problems	↙	
Number/computation **Skills**—Students will perform the following mathematical operations and/or procedures accurately and efficiently, and explain how they work in real-world and mathematic situations: **MA-M-1.2.2** Compute(e.g., estimate, use pencil and paper, use calculator, round, use mental math) large and small quantities and check for reasonable and appropriate computational results	↔	**Number sense, properties, and operations** Use computation and estimation in applications—make estimates appropriate to a given situation—Describe order of magnitude (estimation related to place value, scientific notation

KCCT Framework		NAEP Framework
Geometry/measurement **Concepts**—Students will describe properties of, define, give examples of, and/or apply to both real-world and mathematical situations: **MA-M-2.1.5** US Customary and metric units of measurement		**Measurement** Convert from one measurement to another within the same system (customary or metric)
Geometry/measurement **Skills**—Students will perform the following mathematical operations and/or procedures accurately and efficiently and explain how they work in real-world and mathematical situations: **MA-M-2.2.3** Move shapes in a coordinate plane: translate (slide), rotate (turn), reflect (flip), and dilate (magnify, reduce)		**Geometry and spatial sense** Identify the relationship (congruence, similarity) between a figure and its image under a transformation—use transformations (translations, rotations, reflections, dilations, symmetry)—synthetic *(assessed at the simple level)*
Geometry/measurement **Skills**—Students will perform the following mathematical operations and/or procedures accurately and efficiently and explain how they work in real-world and mathematical situations: **MA-M-2.2.4** Estimate measurements in standard units		**Measurement** Estimate the size of an object or compare objects with respect to a given attribute (such as length, area, capacity, volume, weight/mass
Geometry/measurement **Skills**—Students will perform the following mathematical operations and/or procedures accurately and efficiently and explain how they work in real-world and mathematical situations: **MA-M-2.2.5** Use formulas to find area and perimeter of triangles and quadrilaterals, area and circumference of circles, and surface area and volume of rectangular prisms		**Measurement** Estimate, calculate (using basic principles or formulas), or compare perimeter, area, volume, and surface area in meaningful contexts to solve mathematical and real-world problems—solve problems involving volume and surface area (such as rectangular solids, cylinders, cones, pyramids, prisms, combined forms) [Note: Grades 4 and 8 tasks use manipulatives] *(assessed at simple level)*
		Measurement Apply given measurement formulas for perimeter, area, volume, and surface area in problem settings.
Geometry/measurement **Skills**—Students will perform the following mathematical operations and/or procedures accurately and efficiently and explain how they work in real-world and mathematical situations: **MA-M-2.2.7** Use Pythagorean theorem to find hypotenuse		**Geometry and spatial sense** Apply geometric properties and relationships in solving problems—use Pythagorean relationship to solve problems

KCCT Framework		NAEP Framework
Geometry/measurement **Skills**—Students will perform the following mathematical operations and/or procedures accurately and efficiently and explain how they work in real-world and mathematical situations: **MA-M-2.2.1** Identify characteristics (e.g., sides, vertices, angles, faces, edges, congruent parts) of two-dimensional and three-dimensional shapes		**Geometry and spatial sense** Represent problem situations with geometric models and apply properties of figures in meaning contexts to solve mathematical and real world problems
Probability/statistics **Skills**—Students will perform the following mathematical operations and/or procedures accurately and efficiently, and explain how they work in real-world and mathematical situations: **MA-M-3.2.6** Use counting techniques, tree diagrams, area models, and tables to solve probability problems		**Data analysis, statistics, and probability** Use basic concepts, trees, and formulas for combinations, permutations, and other counting techniques to determine the number of ways an event can occur
Probability/statistics **Skills**—Students will perform the following mathematical operations and/or procedures accurately and efficiently, and explain how they work in real-world and mathematical situations: **MA-M-3.2.4** Calculate theoretical probabilities and tabulate experimental results from simulations		**Data analysis, statistics, and probability** Determine the probability of a simple event—use sample spaces and the definition of probability

KCCT Framework		NAEP Framework
Number/computation **Relationships**—Students will show connections and how connections are made between concepts and skills, explain why procedures work, and make generalizations about mathematics in meaningful ways for the following relationships: **MA-M-1.3.3** How operations (addition and subtractions; multiplication and division; squaring and taking the square root of a number) are inversely related		
Number/computations **Concepts**—Students will describe properties of, define, give examples of, and/or apply to both real-world and mathematical situations: **MA-M-1.1.2** Irrational numbers (square roots and Pi)		**Algebra and functions** Interpret contextual situations and perform algebraic operations (*Note-4.2.1 partial*) on real numbers and algebraic expressions to solve mathematical and real world problems—perform basic operations, using appropriate tools, on real numbers in meaningful contexts (including grouping and order of multiple operations involving basic operations, exponents (*Note-1.3.3 positive whole numbers*), and roots (*Note-1.3.3 square roots*)
Algebraic ideas **Skills**—Students will perform the following mathematical operations and/or procedures accurately and efficiently, and explain how they work in real-world and mathematical situations: **MA-M-4.2.1** Simplify numerical and algebraic expressions		
Number/computation **Skills**—Students will perform the following mathematical operations and/or procedures accurately and efficiently, and explain how they work in real-world and mathematic situations: **MA-M-1.2.5** Apply order of operations		
Algebraic ideas **Relationships**—Students will show connections and how connections are made between concepts and skills, explain why procedures work, and make generalizations about mathematics in meaningful ways for the following relationships: **MA-M-4.3.1** How everyday situations, tables, graphs, patterns verbal rules, and equations relate to each other		**Number sense, properties, and operations** Use elementary number theory—describe number patterns

KCCT Framework Standards
Numbers/computation **Concepts**—Students will describe properties of, define, give examples of, and/or apply to both real-world and mathematical situations: **MA-M-1.1.1** Rational numbers (integers, fractions, decimals, percents)
Numbers/computation **Concepts**—Students will describe properties of, define, give examples of, and/or apply to both real-world and mathematical situations: **MA-M-1.1.3** Meaning of proportion (equivalent ratios)
Numbers/computation **Concepts**—Students will describe properties of, define, give examples of, and/or apply to both real-world and mathematical situations: **MA-M-1.1.5** Positive whole number exponents
Geometry/measurement **Concepts**—Students will describe properties of, define, give examples of, and/or apply to both real-world and mathematical situations: **MA-M-2.1.1** Basic geometric elements that include points, segments, rays, lines, angles, and planes
Geometry/measurement **Concepts**—Students will describe properties of, define, give examples of, and/or apply to both real-world and mathematical situations: **MA-M-2.1.3** Common three-dimensional shapes including spheres, cones, cylinders, prisms (with polygonal bases), and pyramids (with polygonal bases)
Geometry/measurement **Concepts**—Students will describe properties of, define, give examples of, and/or apply to both real-world and mathematical situations: **MA-M-2.1.5** US Customary and metric units of measurement
Probability/statistics **Concepts**—Students will describe properties of, define, give examples of, and/or apply to both real-world and mathematical situations: MA-M-3.1.3 Characteristics and appropriateness of graphs (e.g., bar, line, circle), and plots (e.g., line, stem-and-leaf, box-and-whiskers, scatter)
Algebraic ideas **Concepts**—Students will describe properties of, define, give examples of, and/or apply to both real-world and mathematical situations: **MA-M-4.1.1** Variables, equations, inequalities, and algebraic expressions
Algebraic ideas **Concepts**—Students will describe properties of, define, give examples of, and/or apply to both real-world and

mathematical situations: **MA-M-4.1.3** Rectangular (Cartesian) coordinate system/grid and ordered pairs
Probability/statistics **Skills**—Students will perform the following mathematical operations and/or procedures accurately and efficiently, and explain how they work in real-world and mathematical situations: **MA-M-3.2.7** Represent probabilities in multiple ways such as fractions, decimals, percents, and area models
Geometry/measurement **Relationships**—Students show connections and how connections are made between concepts and skills, explain why procedures work, and make generalizations about mathematics in meaningful ways for the following relationships: **MA-M-2.3.2** How two-dimensional and three-dimensional figures are related as seen in different orientation (e.g., top view, side view, three-dimensional shapes drawn on isometric dot paper)
Algebraic ideas **Relationships**—Students show connections and how connections are made between concepts and skills, explain why procedures work, and make generalizations about mathematics in meaningful ways for the following relationships: **MA-M-4.3.2** How the change in one variable affects the change in another variable (e.g., if rate remains constant, an increase in time results in an increase in distance)

NAEP Only

NAEP Framework Content Standards
Number sense, properties, and operations 1. Relate counting, grouping, and place value—use scientific notation in meaningful contexts
Number sense, properties, and operations Cute with numbers (that is, add, subtract, multiply, divide)—describe features of algorithms (such as regrouping with our without manipulatives, partial product
Number sense, properties, and operations Use computation and estimation in applications—interpret round-off errors using calculators/computers (that is, truncating (*assessed at simple level*)
Number sense, properties, and operations Use elementary number theory—describe odd and even numbers and their characteristics
Number sense, properties, and operations Use elementary number theory—use divisibility and remainders in problem settings (including simple modular arithmetic (*assessed at simple level*)
Measurement Select and use appropriate units of measurement according to—type of unit
Measurement

Select and use appropriate units of measurement according to—size of unit
Measurement Determine precision, accuracy, and error—apply significant digits in meaningful contexts
Measurement Determine precision, accuracy, and error—determine appropriate size of unit of measurement in problem situations
Measurement Determine precision, accuracy, and error—apply concepts of accuracy of measurement in problem situations
Measurement Select appropriate methods of measurement (such as direct or indirect)
Geometry and spatial sense Describe the intersection of two or more geometric figures—planar cross-section of a solid
Geometry and spatial sense Describe the intersection of two or more geometric figures—two dimensional
Geometry and spatial sense Apply geometric properties and relationships in solving problems—use concepts of "between," "inside," "on," and "outside"
Geometry and spatial sense Establish and explain relationships involving geometric concepts—validate and justify conclusions and generalizations
Geometry and spatial sense Establish and explain relationships involving geometric concepts—make conjectures
Geometry and spatial sense Establish and explain relationships involving geometric concepts—use informal induction and deductions
Geometry and spatial sense Represent geometric figures and properties algebraically using coordinates and vectors—use properties of lines (including distance, midpoint, slope, parallelism, perpendicularity) to describe figures algebraically (*assessed at simple level*)
Data analysis, statistics, and probability Read, interpret, and make predictions using tables and graphs—interpolate or extrapolate from data
Data analysis, statistics, and probability Design a statistical experiment to study a problem and communicate the outcomes
Data analysis, statistics, and probability Apply the basic concept of probability to real world situations—use probability related to independent and dependent events
Algebra and functions Use number lines and rectangular coordinate systems as representational tools—transform the graph of a function (*assessed at simple level*)
Algebra and functions Solve systems of equations and inequalities using appropriate methods—solve systems graphically
Algebra and functions Approximate solutions of equations (bisection, sign changes, and successive approximations) (*assessed at simple level*)
Algebra and functions Compare and apply the numerical, symbolic, and graphical properties of a variety of functions and families of functions, examining

general parameters and their effect on curve shape (*assessed at simple level*)

NAEP Frameworks That Were Too General

Too general	**Algebra and Functions** Use mathematical reasoning—make conjecture
Too general	**Algebra and functions** Use mathematical reasoning—validate and justify conclusions and generalizations.
Too general -No direct match	Algebra and functions Use mathematical reasoning—use informal induction and deduction
Too general -Matches all	Algebra and functions Represent problem situations with discrete structures—use finite graphs and matrices (assessed at simple level

Omitted NAEP standard: Algebra and Functions—Use number lines and rectangular coordinate systems as representational tools—Identify or graph sets of points in a polar coordinate system

Appendix D

Appendix D contains summary tables of NAEP released items matched to KCCT content standards.

This table presents NAEP released items for Grade 4 Reading and the corresponding KCCT content standards that workshop participants assigned to the items. Note that the NAEP items do not comprise a complete released test form as is done on KCCT. Note that for a few items, teachers were unsure of which KCCT content standard to assign; these are marked with "Unsure" in the KCCT content standard column. Teachers also believed that two items were linked to inference but were unable to pinpoint the content any further than that.

To view the NAEP released items on the NAEP website, go to http://nces.ed.gov/nationsreportcard/itmrls/pickone.asp and select Reading and Grade 4 under the Search by Block section. You will then be able to select the questions by block and year.

Workshop question number	KCCT content standard	Year	Block	NAEP question number (by block)
1	1.0.006	2000	4R8	1
2	1.0.010	2000	4R8	2
3	1.0.010	2000	4R8	3
4	1.0.008	2000	4R8	4
5	1.0.009; 1.0.006	2000	4R8	5
6	1.0.009	2000	4R8	6
7	1.0.010	2000	4R8	7
8	1.0.007	2000	4R8	8
9	1.0.006	2000	4R8	9
10	2.0.010	1998	4R6	1
11	2.0.009	1998	4R6	2
12	2.0.009	1998	4R6	3
13	2.0.008	1998	4R6	4
14	2.0.009	1998	4R6	5
15	2.0.008	1998	4R6	6
16	2.0.009	1998	4R6	7
17	2.0.009	1998	4R6	8
18	Unsure	1998	4R6	9
19	Unsure	1998	4R6	10
20	1.0.006	1994	4R3	1
21	Unsure	1994	4R3	2
22	1.0.008	1994	4R3	3
23	1.0.009	1994	4R3	4
24	Unsure	1994	4R3	5
25	Unsure	1994	4R3	6
26	Inference?	1994	4R3	7
27	Unsure	1994	4R3	8
28	1.0.008	1994	4R3	9
29	1.0.009	1994	4R3	10
30	Inference?	1994	4R3	11

This table presents NAEP released items for Grade 8 Reading and the corresponding KCCT content standards that workshop participants assigned to the items. Note that the NAEP items do not comprise a complete released test form as is done on KCCT.

To view the NAEP released items on the NAEP website, go to http://nces.ed.gov/nationsreportcard/itmrls/pickone.asp and select Reading and Grade 8 under the Search by Block section. You will then be able to select the questions by block and year.

Workshop question number	KCCT content standard	Year	Block	NAEP question number (by block)
1	1.0.009	1998	8R4	1
2	1.0.008	1998	8R4	2
3	1.0.011	1998	8R4	3
4	1.0.009	1998	8R4	4
5	1.0.009	1998	8R4	5
6	1.0.009, 1.0.008	1998	8R4	6
7	1.0.008, 1.0.011	1998	8R4	7
8	1.0.011, 1.0.006	1998	8R4	8
9	1.0.008	1994	8R3	1
10	1.0.008	1994	8R3	2
11	1.0.008	1994	8R3	3
12	1.0.008	1994	8R3	4
13	1.0.008	1994	8R3	5
14	1.0.014	1994	8R3	6
15	1.0.007	1994	8R3	7
16	1.0.006	1994	8R3	8
17	1.0.009	1994	8R3	9
18	1.0.012	1994	8R3	10
19	1.0.009	1994	8R8	1
20	2.0.008	1994	8R8	2
21	2.0.009	1994	8R8	3
22	2.0.010	1994	8R8	4
23	2.0.011	1994	8R8	5
24	2.0.010	1994	8R8	6
25	1.0.007	1994	8R8	7
26	2.0.011	1994	8R8	8
27	2.0.009	1994	8R8	9

This table presents NAEP released items for Grade 4 Math and the corresponding KCCT content standards that workshop participants assigned to the items. Note that the NAEP items do not comprise a

complete released test form as is done on KCCT. An X in the KCCT content standards column denotes a question that teachers believed did not match any KCCT content standards.

To view the NAEP released items on the NAEP website, go to http://nces.ed.gov/nationsreportcard/itmrls/pickone.asp and select Mathematics and Grade 4 under the Search by Block section. You will then be able to select the questions by block and year.

Workshop question number	KCCT content standard	Year	Block	NAEP question number (by block)
1	1.3.001	1996	4M9	1
2	2.2.007	1996	4M9	2
3	4.1.002	1996	4M9	3
4	3.1.003	1996	4M9	4
5	1.1.002	1996	4M9	5
6	2.2.006* Teachers noted that	1996	4M9	6
7	KCCT requires a standard unit of measurement in a question of this type; NAEP did not 1.2.002	1996	4M9	7
8	3.2.005	1996	4M9	8
9	3.3.002	1996	4M9	9
10	2.3.001	1996	4M9	10
11	3.2.001	1996	4M10	1
12	X	1996	4M10	2
13	X	1996	4M10	3
14	X	1996	4M10	4
15	3.2.005	1996	4M10	5
16	X	1996	4M10	6
17	1.2.002	1996	4M12	1
18	X	1996	4M12	2
19	1.1.002	1996	4M12	3
20	3.2.005	1996	4M12	4
21	1.2.002, 1.1.002* Teachers noted	1996	4M12	5
22	different content for a two-part answer to the question 1.2.002	1996	4M12	6
23	X	1996	4M12	7
24	1.1.001	1996	4M12	8
25	3.3.002	1996	4M12	9
26	2.2.006	1992	4M5	1
27	1.2.006	1992	4M5	2
28	4.2.001	1992	4M5	3
29	2.1.001	1992	4M5	4
30	1.2.002	1992	4M5	5
31	4.1.002	1992	4M5	6
32	2.2.005	1992	4M5	7
33	2.2.005	1992	4M5	8

Workshop question number	KCCT content standard	Year	Block	NAEP question number (by block)
34	X	1992	4M5	9
35	2.2.005	1992	4M5	10
36	X	1992	4M5	11
37	1.1.004	1992	4M5	12
38	1.2.002	1992	4M5	13
39	2.1.003	1992	4M5	14
40	4.2.001	1992	4M5	15
41	3.1.003	1992	4M5	16
42	X	1992	4M5	17
43	1.2.002	1992	4M7	1
44	2.2.005	1992	4M7	2
45	3.1.003	1992	4M7	3
46	2.1.004* Teachers said that the graphic element accompanying this item did not adequately show paper folded in half	1992	4M7	4
47	1.1.004	1992	4M7	5
48	X	1992	4M7	6
49	1.2.002	1992	4M7	7
50	4.2.001	1992	4M7	8
51	3.2.007	1992	4M7	9
52	1.3.001	1992	4M7	10
53	1.2.002	1992	4M12	1
54	X	1992	4M12	2

This table presents NAEP released items for Grade 8 Math and the corresponding KCCT content standards that workshop participants assigned to the items. Note that the NAEP items do not comprise a complete released test form as is done on KCCT. An X in the KCCT content standards column denotes a question that teachers believed did not match any KCCT content standards. An O in the column denotes a question that teachers rated as only a partial match.

To view the NAEP released items on the NAEP website, go to http://nces.ed.gov/nationsreportcard/itmrls/pickone.asp and select Mathematics and Grade 8 under the Search by Block section. You will then be able to select the questions by block and year.

Workshop question number	KCCT content standard	Year	Block	NAEP question number (by block)
1	1.2.002	1996	8M3	1
2	O	1996	8M3	2
3	1.2.001	1996	8M3	3
4	3.3.004, 3.2.005	1996	8M3	4
5	1.2.002	1996	8M3	5
6	3.2.005	1996	8M3	6
7	1.1.006, 1.3.001	1996	8M3	7
8	4.2.001	1996	8M3	8
9	4.2.005	1996	8M3	9
10	4.2.004, 4.2.005	1996	8M3	10
11	O	1996	8M3	11
12	X	1996	8M3	12
13	1.1.004	1996	8M3	13
14	2.2.003	1996	8M10	1
15	2.2.002	1996	8M10	2
16	2.2.002	1996	8M10	3
17	2.1.002	1996	8M10	4
18	2.2.005	1996	8M10	5
19	2.2.005	1996	8M10	6
20	3.2.001, 3.3.001	1996	8M10	7
21	1.2.001	1996	8M12	1
22	1.2.001	1996	8M12	2
23	X	1996	8M12	3
24	X	1996	8M12	4
25	3.2.001, 3.3.001	1996	8M12	5
26	O	1996	8M12	6
27	O	1996	8M12	7
28	1.2.003	1996	8M12	8
29	3.3.003	1996	8M12	9
30	1.2.001	1992	8M5	1
31	1.2.002	1992	8M5	2
32	4.2.004, 4.2.005	1992	8M5	3
33	2.1.002	1992	8M5	4
34	1.2.002	1992	8M5	5
35	1.1.006, 4.2.006	1992	8M5	6
36	2.1.002	1992	8M5	7
37	O	1992	8M5	8
38	1.2.002	1992	8M5	9
39	X	1992	8M5	10
40	X	1992	8M5	11

Workshop question number	KCCT content standard	Year	Block	NAEP question number (by block)
41	1.2.002	1992	8M5	12
42	1.2.002	1992	8M5	13
43	2.2.002	1992	8M5	14
44	4.2.004, 4.2.005	1992	8M5	15
45	3.2.005	1992	8M5	16
46	O	1992	8M5	17
47	3.2.005	1992	8M5	18
48	3.2.005, 3.3.004	1992	8M5	19
49	2.2.006	1992	8M5	20
50	1.1.006, 1.3.001	1992	8M5	21
51	1.2.001	1992	8M7	1
52	2.1.002	1992	8M7	2

Appendix E

Appendix E contains a numeric coding key developed by HumRRO researchers. Each number represents an individual NAEP standard, and these numbers are used in Appendix D in place of the entire standard.

Literature—assessed at Grades 4 and 8

Code	Element of Literary Text	Aspect of Reading
1	Theme	Forming a General Understanding
2	Theme	Developing Interpretation
3	Theme	Making Reader/Text Connections
4	Theme	Examining Content and Structure
5	Major Characters	Forming a General Understanding
6	Major Characters	Developing Interpretation
7	Major Characters	Making Reader/Text Connections
8	Major Characters	Examining Content and Structure
9	Major Events	Forming a General Understanding
10	Major Events	Developing Interpretation
11	Major Events	Making Reader/Text Connections
12	Major Events	Examining Content and Structure
13	Problem	Forming a General Understanding
14	Problem	Developing Interpretation
15	Problem	Making Reader/Text Connections
16	Problem	Examining Content and Structure
17	Vocabulary	Forming a General Understanding
18	Vocabulary	Developing Interpretation
19	Vocabulary	Making Reader/Text Connections
20	Vocabulary	Examining Content and Structure

Informational Text—assessed at Grades 4 and 8

Code	Element of Informational Text	Aspect of Reading
21	Central purpose	Forming a General Understanding
22	Central purpose	Developing Interpretation
23	Central purpose	Making Reader/Text Connections
24	Central purpose	Examining Content and Structure
25	Major ideas	Forming a General Understanding
26	Major ideas	Developing Interpretation
27	Major ideas	Making Reader/Text Connections
28	Major ideas	Examining Content and Structure
29	Supporting ideas	Forming a General Understanding
30	Supporting ideas	Developing Interpretation
31	Supporting ideas	Making Reader/Text Connections
32	Supporting ideas	Examining Content and Structure
33	Adjunct aids	Forming a General Understanding
34	Adjunct aids	Developing Interpretation
35	Adjunct aids	Making Reader/Text Connections
36	Adjunct aids	Examining Content and Structure
37	Vocabulary	Forming a General Understanding
38	Vocabulary	Developing Interpretation
39	Vocabulary	Making Reader/Text Connections
40	Vocabulary	Examining Content and Structure

Practical Text—assessed at Grade 8

Code	Element of Informational Text	Aspect of Reading
41	Central purpose	Forming a General Understanding
42	Central purpose	Developing Interpretation
43	Central purpose	Making Reader/Text Connections
44	Central purpose	Examining Content and Structure
45	Key information	Forming a General Understanding
46	Key information	Developing Interpretation
47	Key information	Making Reader/Text Connections
48	Key information	Examining Content and Structure
49	Key organizing features	Forming a General Understanding
50	Key organizing features	Developing Interpretation
51	Key organizing features	Making Reader/Text Connections
52	Key organizing features	Examining Content and Structure
53	Key graphics	Forming a General Understanding
54	Key graphics	Developing Interpretation
55	Key graphics	Making Reader/Text Connections
56	Key graphics	Examining Content and Structure
57	Vocabulary	Forming a General Understanding
58	Vocabulary	Developing Interpretation
59	Vocabulary	Making Reader/Text Connections
60	Vocabulary	Examining Content and Structure

Number Sense, Properties, and Operations

	Assessed at:		
Code	Gr 4	Gr 8	Topic
1A	X	X	Relate counting, grouping, and place value—use place value to model and describe whole numbers and decimals
1B		X	Relate counting, grouping, and place value—use scientific notation in meaningful contexts
2A	X		Represent numbers and operations in a variety of equivalent forms using models, diagrams, and symbols—model numbers using set models such as counters
2B	X	X	Represent numbers and operations in a variety of equivalent forms using models, diagrams, and symbols—model numbers using number lines
2C	X	X	Represent numbers and operations in a variety of equivalent forms using models, diagrams, and symbols—use two- and three-dimensional region models to describe numbers
2D	X	X	Represent numbers and operations in a variety of equivalent forms using models, diagrams, and symbols—use other models appropriate to a given situation (for example, draw diagrams to represent a number or an operation; write a number sentence to fit a situation or describe a situation to fit a number sentence; interpret calculator or computer displays)
2E	X	X	Represent numbers and operations in a variety of equivalent forms using models, diagrams, and symbols—read, write, rename, order, and compare numbers
3A	X	X	Compute with numbers (that is, add, subtract, multiply, divide)—apply basic properties of operations
3B	X	X	Compute with numbers (that is, add, subtract, multiply, divide)—describe effect of operations on size and order of numbers
3C	X	X	Compute with numbers (that is, add, subtract, multiply, divide)—describe features of algorithms (such as regrouping with or without manipulatives, partial products)
3D	X	X	Compute with numbers (that is, add, subtract, multiply, divide)—select appropriate computation method (such as pencil and paper, calculator, mental arithmetic)
4A	X	X	Use computation and estimation in applications—round whole numbers, decimals, and fractions in meaningful contexts
4Bi	X	X	Use computation and estimation in applications—make estimates appropriate to a given situation—know when to estimate
4Bii	X	X	Use computation and estimation in applications—make estimates appropriate to a given situation—select appropriate type of estimate (overestimate, underestimate, range of estimate)
4Biii	X	X	Use computation and estimation in applications—make estimates appropriate to a given situation—Describe order of magnitude (estimation related to place value, scientific notation)
4C	X	X	Use computation and estimation in applications—select appropriate method of estimation (such as front end, rounding)
4D	X	X	Use computation and estimation in applications—solve application problems involving answers or estimates as appropriate
4E		X	Use computation and estimation in applications—interpret round-off errors using calculators/computers (that is, truncating) *(Grade 8 assessed at simple level)*
4Fi	X	X	Use computation and estimation in applications—verify solutions and determine the reasonableness of results—in real-world situations
5A	X	X	Apply ratios and proportional thinking in a variety of situations—use ratios to describe situations *(Grade 4 assessed at simple level)*
5B		X	Apply ratios and proportional thinking in a variety of situations—use proportions to model problems
5C		X	Apply ratios and proportional thinking in a variety of situations—use proportional thinking to solve problems (including rates, scaling, and similarity)

5D	X	X	Apply ratios and proportional thinking in a variety of situations—understand the meaning of percentage (including percentages greater than 100 and less than 1) *(Grade 4 assessed at simple level)*
5E		X	Apply ratios and proportional thinking in a variety of situations—solve problems involving percentages
6A	X	X	Use elementary number theory—describe odd and even numbers and their characteristics
6B	X	X	Use elementary number theory—describe number patterns *(Grade 4 assessed at simple level)*
6C		X	Use elementary number theory—use factors and multiples to model and solve problems
6D		X	Use elementary number theory—describe prime numbers
6E		X	Use elementary number theory—use divisibility and remainders in problem settings (including simple modular arithmetic) *(Grade 8 assessed at simple level)*

Measurement

Assessed at:

Code	Gr 4	Gr 8	Topic
7	X	X	Estimate the size of an object or compare objects with respect to a given attribute (such as length, area, capacity, volume, weight/mass)
8	X	X	Select and use appropriate measurement instruments (for example, manipulatives such as ruler, meter stick, protractor, thermometer, scales for weight or mass, gauges)
9A	X	X	Select and use appropriate units of measurement according to—type of unit
9B	X	X	Select and use appropriate units of measurement according to—size of unit
10A	X	X	Estimate, calculate (using basic principles or formulas), or compare perimeter, area, volume, and surface area in meaningful contexts to solve mathematical and real-world problems—solve problems involving perimeter and area (such as triangles, quadrilaterals, other polygons, circles, combined forms) *(Grade 4 assessed at simple level)*
10B	X	X	Estimate, calculate (using basic principles or formulas), or compare perimeter, area, volume, and surface area in meaningful contexts to solve mathematical and real-world problems—solve problems involving volume and surface area (such as rectangular solids, cylinders, cones, pyramids, prisms, combined forms) [Note: Grades 4 and 8 tasks use manipulatives] *(both grades assessed at simple level)*
11		X	Apply given measurement formulas for perimeter, area, volume, and surface area in problem settings
12		X	Convert from one measurement to another within the same system (customary or metric)
13A		X	Determine precision, accuracy, and error—apply significant digits in meaningful contexts
13B		X	Determine precision, accuracy, and error—determine appropriate size of unit of measurement in problem situations
13C		X	Determine precision, accuracy, and error—apply concepts of accuracy of measurement in problem situations
14		X	Make and read scale drawings
15	X	X	Select appropriate methods of measurement (such as direct or indirect)
16		X	Apply the concept of rate to measurement situations

Geometry and Spatial Sense

Assessed at:

Code	Gr 4	Gr 8	Topic
17A	X	X	Describe, visualize, draw, and construct geometric figures—draw or sketch a figure given a verbal description (open-ended items)
17B		X	Describe, visualize, draw, and construct geometric figures—given a figure, write a verbal description of its geometric qualities

18	X	X	Investigate and predict results of combining, subdividing, and changing shapes (such as paper folding, dissecting, tiling, rearranging pieces of solids)
19A	X	X	Identify the relationship (congruence, similarity) between a figure and its image under a transformation—use motion geometry (informal: lines of symmetry, flips, turns, slides)
19Bi		X	Identify the relationship (congruence, similarity) between a figure and its image under a transformation—use transformations (translations, rotations, reflections, dilations, symmetry)—synthetic *(Grade 8 assessed at simple level)*
20A		X	Describe the intersection of two or more geometric figures—two dimensional
20B		X	Describe the intersection of two or more geometric figures—planar cross-section of a solid
21		X	Classify figures in terms of congruence and similarity, and informally apply these relationships using proportional reasoning where appropriate
22A	X	X	Apply geometric properties and relationships in solving problems—use concepts of "between," "inside," "on," and "outside"
22B		X	Apply geometric properties and relationships in solving problems—use the Pythagorean relationship to solve problems
22C		X	Apply geometric properties and relationships in solving problems—apply properties of ratio and proportion with respect to similarity *(Grade 8 assessed at simple level)*
23A	X	X	Establish and explain relationships involving geometric concepts—make conjectures
23B	X	X	Establish and explain relationships involving geometric concepts—validate and justify conclusions and generalizations
23C	X	X	Establish and explain relationships involving geometric concepts—use informal induction and deduction *(Grade 4 assessed at simple level)*
24	X	X	Represent problem situations with geometric models and apply properties of figures in meaningful contexts to solve mathematical and real world problems
25A		X	Represent geometric figures and properties algebraically using coordinates and vectors—use properties of lines (including distance, midpoint, slope, parallelism, perpendicularity) to describe figures algebraically *(Grade 8 assessed at simple level)*

Data Analysis, Statistics, and Probability

	Assessed at:		
Code	Gr 4	Gr 8	Topic
26A	X	X	Read, interpret, and make predictions using tables and graphs—read and interpret data
26B	X	X	Read, interpret, and make predictions using tables and graphs—solve problems by estimating and computing with data
26C		X	Read, interpret, and make predictions using tables and graphs—interpolate or extrapolate from data
27A	X	X	Organize and display data and make inferences—use tables, histograms (bar graphs), pictograms, and line graphs
27B		X	Organize and display data and make inferences—use circle graphs and scattergrams
27C		X	Organize and display data and make inferences—use stem-and-leaf plots and box-and-whisker plots
27D		X	Organize and display data and make inferences—make decisions about outliers
28A		X	Understand and apply sampling, randomness, and bias in data collection—given a situation, identify sources of sampling error
28B		X	Understand and apply sampling, randomness, and bias in data collection—describe a procedure for selecting an unbiased sample
28C		X	Understand and apply sampling, randomness, and bias in data collection—make generalizations based on sample results
29	X	X	Describe measures of central tendency and dispersion in real world situations *(Grade 4 assessed at simple level)*
31A	X	X	Understand and reason about the use and misuse of statistics in our society—given certain situations and reported results, identify faulty arguments or misleading presentations of the data *(Grade 4 assessed at simple level)*

31B	X	X	Understand and reason about the use and misuse of statistics in our society—appropriately apply statistics to real world situations *(Grade 4 assessed at simple level)*
33		X	Design a statistical experiment to study a problem and communicate the outcomes
34		X	Use basic concepts, trees, and formulas for combinations, permutations, and other counting techniques to determine the number of ways an event can occur
35A		X	Determine the probability of a simple event—estimate probabilities by use of simulations
35B	X	X	Determine the probability of a simple event—use sample spaces and the definition of probability to describe events
35C		X	Determine the probability of a simple event—describe and make predictions about expected outcomes
36A	X	X	Apply the basic concept of probability to real world situations—use probabilistic thinking informally
36B		X	Apply the basic concept of probability to real world situations—use probability related to independent and dependent events

Algebra and Functions

Code	Assessed at: Gr 4	Gr 8	Topic
37A	X	X	Describe, extend, interpolate, transform, and create a wide variety of patterns and functional relationships—recognize patterns and sequences
37B	X	X	Describe, extend, interpolate, transform, and create a wide variety of patterns and functional relationships—extend a pattern or functional relationship
37C		X	Describe, extend, interpolate, transform, and create a wide variety of patterns and functional relationships—given a verbal description, extend or interpolate with a pattern (complete a missing term)
37D	X	X	Describe, extend, interpolate, transform, and create a wide variety of patterns and functional relationships—translate patterns from one context to another *(Grade 4 assessed at simple level)*
37E	X	X	Describe, extend, interpolate, transform, and create a wide variety of patterns and functional relationships—create an example of a pattern or functional relationship
37F	X	X	Describe, extend, interpolate, transform, and create a wide variety of patterns and functional relationships—understand and apply the concept of a variable *(Grade 4 assessed at simple level)*
38	X	X	Use multiple representations for situations to translate among diagrams, models, and symbolic expressions
39A	X	X	Use number lines and rectangular coordinate systems as representational tools—identify or graph sets of points on a number line or in a rectangular coordinate system
39B		X	Use number lines and rectangular coordinate systems as representational tools—Identify or graph sets of points in a polar coordinate system
39C		X	Use number lines and rectangular coordinate systems as representational tools—work with applications using coordinates
39D		X	Use number lines and rectangular coordinate systems as representational tools—transform the graph of a function *(Grade 8 assessed at simple level)*
40A	X	X	Represent and describe solutions to linear equations and inequalities to solve mathematical and real word problems—provide solution sets of whole numbers
40B	X	X	Represent and describe solutions to linear equations and inequalities to solve mathematical and real word problems—provide solution sets of real numbers *(Grade 4 assessed at simple level)*
41A		X	Interpret contextual situations and perform algebraic operations on real numbers and algebraic expressions to solve mathematical and real world problems—perform basic operations, using appropriate tools, on real numbers in meaningful contexts (including grouping and order of multiple operations involving basic operations, exponents, and roots)

41B		X	Interpret contextual situations and perform algebraic operations on real numbers and algebraic expressions to solve mathematical and real world problems—solve problems involving substitution in expressions and formulas
41C		X	Interpret contextual situations and perform algebraic operations on real numbers and algebraic expressions to solve mathematical and real world problems—solve meaningful problems involving a formula with one variable
41D		X	Interpret contextual situations and perform algebraic operations on real numbers and algebraic expressions to solve mathematical and real world problems—use equivalent forms to solve problems
42A		X	Solve systems of equations and inequalities using appropriate methods—solve systems graphically
43A	X	X	Use mathematical reasoning—make conjectures
43B	X	X	Use mathematical reasoning—validate and justify conclusions and generalizations
43C	X	X	Use mathematical reasoning—use informal induction and deduction *(Grade 4 assessed at simple level)*
44A		X	Represent problem situations with discrete structures—use finite graphs and matrices *(Grade 8 assessed at simple level)*
46		X	Approximate solutions of equations (bisection, sign changes, and successive approximations) *(Grade 8 assessed at simple level)*
48		X	Compare and apply the numerical, symbolic, and graphical properties of a variety of functions and families of functions, examining general parameters and their effect on curve shape *(Grade 8 assessed at simple level)*
49		X	Apply function concepts to model and deal with real world situations *(Grade 8 assessed at simple level)*

Appendix F

Appendix F contains KCCT operational items by form and item number, with applicable KCCT and NAEP standards (NAEP standards appear as number codes). NAEP standards that appear in italics represent partial/unsure matches.

Grade 4 Reading

Index Number	Form Number	Item Number	KCCT	NAEP
0209	1	1	1.0.006	9, 25
2839	1	2	1.0.001	17, 18, 20
2840	1	3	1.0.006	9, 25
2841	1	4	1.0.006	9, 25
2842	1	5	1.0.006	9, 25
2843	1	6	2.0.008	*29, 30, 31*[1]
2844	1	7	2.0.008	*29, 30, 31*
2845	1	8	2.0.008	*29, 30, 31*
2846	1	9	2.0.008	*29, 30, 31*
2847	1	10	2.0.008	*29, 30, 31*
2848	1	11	4.0.006	No match
2849	1	12	4.0.006	No match
2850	1	13	4.0.006	No match
2851	1	14	4.0.006	No match
2852	1	15	4.0.006	No match
2853	1	16	3.0.001	No match
2854	1	17	3.0.007	No match
2855	1	18	3.0.007	No match
2856	1	19	3.0.005	No match
2857	1	20	3.0.007	No match
2858	1	21	1.0.009	5, 6, 8, 14
2859	1	22	1.0.009	5, 6, 8, 14
2860	1	23	1.0.010	*3, 7*
2861	1	24	1.0.008	2, 11, 13
2862	1	25	1.0.009	5, 6, 8, 14
2863	1	26	1.0.006	9, 25
2864	1	27	1.0.006	9, 25
2865	1	28	1.0.006	9, 25
2866	1	29	1.0.006	9, 25
2867	1	30	1.0.006	9, 25
0009	2	1	1.0.006	9, 25
0010	2	2	1.0.001	17, 18, 20
0011	2	3	1.0.006	9, 25
0012	2	4	1.0.006	9, 25
0013	2	5	1.0.006	9, 25
0014	2	6	2.0.008	*29, 30, 31*
0015	2	7	2.0.008	*29, 30, 31*
0016	2	8	2.0.008	*29, 30, 31*
0017	2	9	2.0.008	*29, 30, 31*
0018	2	10	2.0.008	*29, 30, 31*
0019	2	11	4.0.006	No match
0020	2	12	4.0.009	No match
0021	2	13	4.0.003	19
0022	2	14	4.0.010	33, 34, 35, 36

Index Number	Form Number	Item Number	KCCT	NAEP
0023	2	15	4.0.006	No match
0024	2	16	1.0.010	*3, 7*
0025	2	17	1.0.006	9, 25
0026	2	18	1.0.006	9, 25
0027	2	19	1.0.006	9, 25
0028	2	20	1.0.006	9, 25
0029	2	21	2.0.008	*29, 30, 31*
0030	2	22	2.0.008	*29, 30, 31*
0031	2	23	2.0.003	38, 39
0032	2	24	2.0.008	*29, 30, 31*
0033	2	25	2.0.010	No match
0034	2	26	1.0.006	9, 25
0035	2	27	1.0.006	9, 25
0036	2	28	1.0.002	No match
0037	2	29	1.0.008	2, 11, 13
0038	2	30	1.0.009	5, 6, 8, 14
0049	3	1	1.0.009	5, 6, 8, 14
0050	3	2	1.0.007	*4, 12, 16*
0051	3	3	1.0.003	19
0052	3	4	1.0.008	2, 11, 13
0053	3	5	1.0.010	*3, 7*
0054	3	6	4.0.006	No match
0055	3	7	4.0.009	No match
0056	3	8	4.0.006	No match
0057	3	9	4.0.010	33, 34, 35, 36
0058	3	10	4.0.006	No match
0059	3	11	2.0.008	*29, 30, 31*
0060	3	12	2.0.001	No match
0061	3	13	2.0.008	*29, 30, 31*
0062	3	14	2.0.001	No match
0063	3	15	2.0.010	No match
0064	3	16	1.0.010	*3, 7*
0065	3	17	1.0.006	9, 25
0066	3	18	1.0.006	9, 25
0067	3	19	1.0.006	9, 25
0068	3	20	1.0.006	9, 25
0069	3	21	1.0.004	No match
0070	3	22	1.0.006	9, 25
0071	3	23	1.0.006	9, 25
0072	3	24	1.0.002	No match
0073	3	25	1.0.006	9, 25
0074	3	26	3.0.001	No match
0075	3	27	3.0.007	No match
0076	3	28	3.0.007	No match
0077	3	29	3.0.005	No match

Index Number	Form Number	Item Number	KCCT	NAEP
0078	3	30	3.0.007	No match
0089	4	1	1.0.009	5, 6, 8, 14
0090	4	2	1.0.007	*4, 12, 16*
0091	4	3	1.0.003	19
0092	4	4	1.0.008	2, 11, 13
0093	4	5	1.0.010	*3, 7*
0094	4	6	2.0.009	No match
0095	4	7	2.0.006	33, 34, 35, 36
0096	4	8	2.0.009	No match
0097	4	9	2.0.009	No match
0098	4	10	2.0.009	No match
0099	4	11	1.0.006	9, 25
0100	4	12	1.0.001	17, 18, 20
0101	4	13	1.0.009	5, 6, 8, 14
0102	4	14	1.0.004	No match
0103	4	15	1.0.009	5, 6, 8, 14
0104	4	16	4.0.009	No match
0105	4	17	4.0.002	No match
0106	4	18	4.0.008	No match
0107	4	19	4.0.008	No match
0108	4	20	4.0.007	No match
0109	4	21	1.0.009	5, 6, 8, 14
0110	4	22	1.0.006	9, 25
0111	4	23	1.0.009	5, 6, 8, 14
0112	4	24	1.0.009	5, 6, 8, 14
0113	4	25	1.0.006	9, 25
0114	4	26	2.0.008	*29, 30, 31*
0115	4	27	2.0.008	*29, 30, 31*
0116	4	28	2.0.008	*29, 30, 31*
0117	4	29	2.0.008	*29, 30, 31*
0118	4	30	2.0.008	*29, 30, 31*
0129	5	1	2.0.008	*29, 30, 31*
0130	5	2	2.0.008	*29, 30, 31*
0131	5	3	2.0.008	*29, 30, 31*
0132	5	4	2.0.008	*29, 30, 31*
0133	5	5	2.0.008	*29, 30, 31*
0134	5	6	1.0.009	5, 6, 8, 14
0135	5	7	1.0.009	5, 6, 8, 14
0136	5	8	1.0.009	5, 6, 8, 14
0137	5	9	1.0.006	9, 25
0138	5	10	1.0.009	5, 6, 8, 14
0139	5	11	1.0.008	2, 11, 13
0140	5	12	1.0.006	9, 25
0141	5	13	1.0.008	2, 11, 13
0142	5	14	1.0.008	2, 11, 13

Index Number	Form Number	Item Number	KCCT	NAEP
0143	5	15	1.0.010	*3, 7*
0144	5	16	4.0.009	No match
0145	5	17	4.0.002	No match
0146	5	18	4.0.008	No match
0147	5	19	4.0.008	No match
0148	5	20	4.0.007	No match
0149	5	21	1.0.006	9, 25
0150	5	22	1.0.001	17, 18, 20
0151	5	23	1.0.006	9, 25
0152	5	24	1.0.006	9, 25
0153	5	25	1.0.006	9, 25
0154	5	26	2.0.008	*29, 30, 31*
0155	5	27	2.0.008	*29, 30, 31*
0156	5	28	2.0.001	No match
0157	5	29	2.0.001	No match
0158	5	30	2.0.010	No match
0169	6	1	2.0.008	*29, 30, 31*
0170	6	2	2.0.008	*29, 30, 31*
0171	6	3	2.0.008	*29, 30, 31*
0172	6	4	2.0.008	*29, 30, 31*
0173	6	5	2.0.008	*29, 30, 31*
0174	6	6	1.0.006	9, 25
0175	6	7	1.0.006	9, 25
0176	6	8	1.0.006	9, 25
0177	6	9	1.0.006	9, 25
0178	6	10	1.0.009	5, 6, 8, 14
0179	6	11	4.0.006	No match
0180	6	12	4.0.009	No match
0181	6	13	4.0.003	19
0182	6	14	4.0.010	33, 34, 35, 36
0183	6	15	4.0.006	No match
0184	6	16	3.0.001	No match
0185	6	17	3.0.007	No match
0186	6	18	3.0.007	No match
0187	6	19	3.0.005	No match
0188	6	20	3.0.007	No match
0189	6	21	1.0.006	9, 25
0190	6	22	1.0.008	2, 11, 13
0191	6	23	1.0.009	5, 6, 8, 14
0192	6	24	1.0.009	5, 6, 8, 14
0193	6	25	1.0.006	9, 25
0194	6	26	1.0.006	9, 25
0195	6	27	1.0.004	No match
0196	6	28	1.0.001	17, 18, 20
0197	6	29	1.0.006	9, 25

Index Number	Form Number	Item Number	KCCT	NAEP
0198	6	30	1.0.006	9, 25

[1]Numbers in italics represent NAEP content standards classified as "close/unsure/partial" matches to KCCT content standards

Grade 7 Reading

Index Number	Form Number	Item Number	KCCT	NAEP
1898	1	1	2.0.008	26, 38
1899	1	2	2.0.013	22
1900	1	3	2.0.013	22
1901	1	4	2.0.013	22
1902	1	5	2.0.008	26, 38
1903	1	6	3.0.013	*18, 59, 60*[1]
1904	1	7	3.0.004	No match
1905	1	8	3.0.014	No match
1906	1	9	3.0.016	No match
1907	1	10	3.0.015	No match
1908	1	11	1.0.016	No match
1909	1	12	1.0.016	No match
1910	1	13	1.0.004	No match
1911	1	14	1.0.003	19
1912	1	15	1.0.013	1, 2
1913	1	16	4.0.011	42, 57
1914	1	17	4.0.014	40
1915	1	18	4.0.006	50
1916	1	19	4.0.011	42, 57
1917	1	20	4.0.011	42, 57
1918	1	21	2.0.013	22
1919	1	22	2.0.001	24
1920	1	23	2.0.011	28, 33, 34, 35,
1921	1	24	2.0.013	36, 56 22
1922	1	25	2.0.011	28, 33, 34, 35,
1923	1	26	1.0.001	36, 56 21
1924	1	27	1.0.009	12, 16, 20
1925	1	28	1.0.013	1, 2
1926	1	29	1.0.015	14
1927	1	30	1.0.013	1, 2
1938	2	1	2.0.008	26, 38
1939	2	2	2.0.013	22
1940	2	3	2.0.013	22
1941	2	4	2.0.013	22
1942	2	5	2.0.008	26, 38
1943	2	6	4.0.002	No match
1944	2	7	4.0.008	51
1945	2	8	4.0.003	58
1946	2	9	4.0.012	*48*
1947	2	10	4.0.011	42, 57
1948	2	11	1.0.013	1, 2
1949	2	12	1.0.011	15

Index Number	Form Number	Item Number	KCCT	NAEP
1950	2	13	1.0.002	No match
1951	2	14	1.0.015	14
1952	2	15	1.0.013	1, 2
1953	2	16	4.0.003	58
1954	2	17	4.0.012	*48*
1955	2	18	4.0.011	42, 57
1956	2	19	4.0.002	No match
1957	2	20	4.0.011	42, 57
1958	2	21	1.0.013	1, 2
1959	2	22	1.0.015	14
1960	2	23	1.0.011	15
1961	2	24	1.0.003	19
1962	2	25	1.0.013	1, 2
1963	2	26	4.0.012	*48*
1964	2	27	4.0.003	58
1965	2	28	4.0.008	51
1966	2	29	4.0.011	42, 57
1967	2	30	4.0.013	49, 52
1320	3	1	1.0.010	3, 7
1321	3	2	1.0.003	19
1322	3	3	1.0.008	11
1323	3	4	1.0.002	No match
1324	3	5	1.0.009	12, 16, 20
1325	3	6	3.0.011	No match
1326	3	7	3.0.006	50
1327	3	8	3.0.006	50
1328	3	9	3.0.009	29, 30, 31
1329	3	10	3.0.007	26
1330	3	11	2.0.011	28, 33, 34, 35, 36, 56
1331	3	12	2.0.008	26, 38
1332	3	13	2.0.013	22
1333	3	14	2.0.013	22
1334	3	15	2.0.014	9, 25
1335	3	16	4.0.003	58
1336	3	17	4.0.012	*48*
1337	3	18	4.0.011	42, 57
1338	3	19	4.0.002	No match
1339	3	20	4.0.011	42, 57
1340	3	21	1.0.009	12, 16, 20
1341	3	22	1.0.009	12, 16, 20
1342	3	23	1.0.012	4
1343	3	24	1.0.012	4
1344	3	25	1.0.012	4
1345	3	26	4.0.012	*48*

Index Number	Form Number	Item Number	KCCT	NAEP
1346	3	27	4.0.014	40
1347	3	28	4.0.011	42, 57
1348	3	29	4.0.009	32, 37, 43, 44, 45, 53, 54, 55
1349	3	30	4.0.009	32, 37, 43, 44, 45, 53, 54, 55
1360	4	1	1.0.010	3, 7
1361	4	2	1.0.003	19
1362	4	3	1.0.008	11
1363	4	4	1.0.002	No match
1364	4	5	1.0.009	12, 16, 20
1365	4	6	4.0.013	49, 52
1366	4	7	4.0.001	41
1367	4	8	4.0.008	51
1368	4	9	4.0.009	32, 37, 43, 44, 45, 53, 54, 55
1369	4	10	4.0.008	51
1370	4	11	2.0.014	9, 25
1371	4	12	2.0.005	No match
1372	4	13	2.0.012	46
1373	4	14	2.0.006	50
1374	4	15	2.0.008	26, 38
1375	4	16	4.0.011	42, 57
1376	4	17	4.0.006	50
1377	4	18	4.0.011	42, 57
1378	4	19	4.0.013	49, 52
1379	4	20	4.0.009	32, 37, 43, 44, 45, 53, 54, 55
1380	4	21	1.0.012	4
1381	4	22	1.0.008	11
1382	4	23	1.0.003	19
1383	4	24	1.0.009	12, 16, 20
1384	4	25	1.0.009	12, 16, 20
1385	4	26	1.0.012	4
1386	4	27	1.0.006	10
1387	4	28	1.0.008	11
1388	4	29	1.0.008	11
1389	4	30	1.0.014	6, 8, 13
1400	5	1	1.0.014	6, 8, 13
1401	5	2	1.0.014	6, 8, 13
1402	5	3	1.0.016	No match
1403	5	4	1.0.003	19
1404	5	5	1.0.010	3, 7
1405	5	6	2.0.012	46
1406	5	7	2.0.002	No match

Index Number	Form Number	Item Number	KCCT	NAEP
1407	5	8	2.0.011	28, 33, 34, 35, 36, 56
1408	5	9	2.0.005	No match
1409	5	10	2.0.008	26, 38
1410	5	11	2.0.005	No match
1411	5	12	2.0.001	24
1412	5	13	2.0.004	No match
1413	5	14	2.0.011	28, 33, 34, 35, 36, 56
1414	5	15	2.0.011	28, 33, 34, 35, 36, 56
1415	5	16	4.0.011	42, 57
1416	5	17	4.0.006	50
1417	5	18	4.0.011	42, 57
1418	5	19	4.0.013	49, 52
1419	5	20	4.0.009	32, 37, 43, 44, 45, 53, 54, 55
1420	5	21	1.0.015	14
1421	5	22	1.0.013	1, 2
1422	5	23	1.0.013	1, 2
1423	5	24	1.0.008	11
1424	5	25	1.0.014	6, 8, 13
1425	5	26	3.0.016	No match
1426	5	27	3.0.006	50
1427	5	28	3.0.006	50
1428	5	29	3.0.008	26, 38
1429	5	30	3.0.016	No match
1440	6	1	1.0.014	6, 8, 13
1441	6	2	1.0.014	6, 8, 13
1442	6	3	1.0.016	No match
1443	6	4	1.0.003	19
1444	6	5	1.0.010	3, 7
1445	6	6	2.0.002	No match
1446	6	7	2.0.013	22
1447	6	8	2.0.008	26, 38
1448	6	9	2.0.008	26, 38
1449	6	10	2.0.009	29, 30, 31
1450	6	11	3.0.009	29, 30, 31
1451	6	12	3.0.015	No match
1452	6	13	3.0.016	No match
1453	6	14	3.0.001	No match
1454	6	15	3.0.015	No match
1455	6	16	4.0.011	42, 57
1456	6	17	4.0.014	40
1457	6	18	4.0.006	50

Index Number	Form Number	Item Number	KCCT	NAEP
1458	6	19	4.0.011	42, 57
1459	6	20	4.0.011	42, 57
1460	6	21	1.0.016	No match
1461	6	22	1.0.010	3, 7
1462	6	23	1.0.002	No match
1463	6	24	1.0.011	15
1464	6	25	1.0.016	No match
1465	6	26	2.0.014	9, 25
1466	6	27	2.0.014	9, 25
1467	6	28	2.0.013	22
1468	6	29	2.0.008	26, 38
1469	6	30	2.0.008	26, 38

[1] Numbers in italics represent NAEP standards that are rated as partial matches to KCCT standards.

Grade 5 Math

Index number	Form number	Item number	KCCT	NAEP
630	1	1	2.1.004	No match
631	1	2	3.2.005	26a, 26b, 27a
632	1	3	1.2.007	No match
633	1	4	1.2.002	3d, 4d, 4fi
634	1	5	3.1.002	35b
635	1	6	1.1.004	1, 4biii
636	1	7	2.3.003	No match
637	1	8	4.2.003	37f, 40a, 40b
638	1	9	4.2.001	6b, 37b, 37e, 43a
639	1	10	1.3.003	No match
640	1	11	4.2.003	37f, 40a, 40b
641	1	12	2.2.001	No match
642	1	13	1.1.004	1, 4biii
643	1	14	2.3.003	No match
644	1	15	1.2.002	3d, 4d, 4fi
645	1	16	3.1.002	35b
646	1	17	1.2.009	No match
647	1	18	4.1.003	39a
648	1	19	1.2.002	3d, 4d, 4fi
649	1	20	2.3.003	No match
650	1	21	1.3.001	No match
651	1	22	3.1.003	31b
652	1	23	1.3.001	No match
653	1	24	1.2.002	3d, 4d, 4fi
654	1	25	2.1.002	17a
655	1	26	4.2.001	6b, 37b, 37e, 43a
656	1	27	1.2.003	No match
657	1	28	2.1.003	?
658	1	29	1.3.001	No match
669	1	35	2.2.008	7
670	2	1	2.1.004	No match
671	2	2	3.2.005	26a, 26b, 27a
672	2	3	1.2.007	No match
673	2	4	1.2.002	3d, 4d, 4fi
674	2	5	1.2.004	No match
675	2	6	4.2.003	37f, 40a, 40b
676	2	7	1.1.005	2a, 2c, 2d
677	2	8	1.2.002	3d, 4d, 4fi
678	2	9	3.2.007	35b, 36a
679	2	10	1.3.002	No match
680	2	11	4.2.001	6b, 37b, 37e, 43a
681	2	12	2.2.005	10a, 15
682	2	13	1.2.009	No match
683	2	14	2.3.001	18, 23a, 23b,

Index number	Form number	Item number	KCCT	NAEP
				23c, 24
684	2	15	1.2.002	3d, 4d, 4fi
685	2	16	1.2.002	3d, 4d, 4fi
686	2	17	4.2.001	6b, 37b, 37e, 43a
687	2	18	2.1.002	17a
688	2	19	3.3.003	No match
689	2	20	1.1.003	6a
690	2	21	1.1.001	No match
691	2	22	3.1.001	29, 31b
692	2	23	1.1.003	6a
693	2	24	2.2.005	10a, 15
694	2	25	4.2.001	6b, 37b, 37e, 43a
695	2	26	3.1.003	31b
696	2	27	2.3.003	No match
697	2	28	1.1.001	No match
698	2	29	2.2.006	10b, 15
709	2	35	1.2.004	No match
710	3	1	4.2.001	6b, 37b, 37e, 43a
711	3	2	1.2.004	No match
712	3	3	1.1.003	6a
713	3	4	3.2.003	27a
714	3	5	2.1.005	9a, 9b
715	3	6	3.2.006	No match
716	3	7	1.2.002	3d, 4d, 4fi
717	3	8	1.2.009	No match
718	3	9	4.1.003	39a
719	3	10	2.2.005	10a, 15
720	3	11	3.2.006	No match
721	3	12	1.2.002	3d, 4d, 4fi
722	3	13	1.2.009	No match
723	3	14	2.3.001	18, 23a, 23b, 23c, 24
724	3	15	1.2.002	3d, 4d, 4fi
725	3	16	1.2.002	3d, 4d, 4fi
726	3	17	2.1.004	No match
727	3	18	1.2.008	No match
728	3	19	1.1.004	1, 4biii
729	3	20	2.2.001	No match
730	3	21	3.1.003	31b
731	3	22	1.1.003	6a
732	3	23	2.1.001	No match
733	3	24	1.2.002	3d, 4d, 4fi
734	3	25	3.2.003	27a
735	3	26	4.2.003	37f, 40a, 40b
736	3	27	2.2.005	10a, 15

Index number	Form number	Item number	KCCT	NAEP
737	3	28	1.3.001	No match
738	3	29	2.1.001	No match
749	3	35	2.2.005	10a, 15
750	4	1	4.2.001	6b, 37b, 37e, 43a
751	4	2	1.2.004	No match
752	4	3	1.1.003	6a
753	4	4	3.2.003	27a
754	4	5	1.1.003	6a
755	4	6	4.3.002	43b, 43c
756	4	7	2.2.005	10a, 15
757	4	8	1.2.002	3d, 4d, 4fi
758	4	9	3.1.001	29, 31b
759	4	10	4.2.002	No match
760	4	11	1.2.002	3d, 4d, 4fi
761	4	12	2.2.006	10b, 15
762	4	13	2.2.005	10a, 15
763	4	14	1.3.003	No match
764	4	15	4.2.003	37f, 40a, 40b
765	4	16	1.3.001	No match
766	4	17	2.1.001	No match
767	4	18	1.2.003	No match
768	4	19	3.2.008	36a
769	4	20	1.3.001	No match
770	4	21	2.1.001	No match
771	4	22	3.3.001	No match
772	4	23	1.2.008	No match
773	4	24	2.3.003	No match
774	4	25	3.1.003	31b
775	4	26	1.2.002	3d, 4d, 4fi
776	4	27	1.2.006	?
777	4	28	2.1.001	No match
778	4	29	1.2.005	No match
789	4	35	1.2.004	No match
790	5	1	4.2.001	6b, 37b, 37e, 43a
791	5	2	2.1.004	No match
792	5	3	1.2.002	3d, 4d, 4fi
793	5	4	1.1.004	1, 4biii
794	5	5	1.1.005	2a, 2c, 2d
795	5	6	4.2.001	6b, 37b, 37e, 43a
796	5	7	3.1.001	29, 31b
797	5	8	1.2.009	No match
798	5	9	2.2.007	8
799	5	10	1.2.009	No match
800	5	11	3.2.003	27a
801	5	12	1.1.003	6a

Index number	Form number	Item number	KCCT	NAEP
802	5	13	2.2.005	10a, 15
803	5	14	1.3.003	No match
804	5	15	4.2.003	37f, 40a, 40b
805	5	16	1.3.001	No match
806	5	17	1.3.001	No match
807	5	18	2.1.001	No match
808	5	19	1.1.004	1, 4biii
809	5	20	3.2.006	No match
810	5	21	2.3.003	No match
811	5	22	2.1.004	No match
812	5	23	1.2.002	3d, 4d, 4fi
813	5	24	1.1.003	6a
814	5	25	2.2.003	19a
815	5	26	4.2.003	37f, 40a, 40b
816	5	27	1.1.004	1, 4biii
817	5	28	1.2.007	No match
818	5	29	3.2.001	No match
829	5	35	4.2.001	6b, 37b, 37e, 43a
830	6	1	4.2.001	6b, 37b, 37e, 43a
831	6	2	2.1.004	No match
832	6	3	1.2.002	3d, 4d, 4fi
833	6	4	1.1.004	1, 4biii
834	6	5	2.2.008	7
835	6	6	2.2.001	No match
836	6	7	1.3.001	No match
837	6	8	3.1.003	31b
838	6	9	1.1.004	1, 4biii
839	6	10	3.2.007	35b, 36a
840	6	11	1.2.002	3d, 4d, 4fi
841	6	12	1.1.005	2a, 2c, 2d
842	6	13	1.1.004	1, 4biii
843	6	14	2.3.003	No match
844	6	15	1.2.002	3d, 4d, 4fi
845	6	16	3.1.002	35b
846	6	17	4.2.003	37f, 40a, 40b
847	6	18	4.2.003	37f, 40a, 40b
848	6	19	1.2.004	No match
849	6	20	2.1.004	No match
850	6	21	1.2.002	3d, 4d, 4fi
851	6	22	1.2.006	?
852	6	23	4.2.002	No match
853	6	24	1.2.005	No match
854	6	25	2.2.005	10a, 15
855	6	26	1.2.006	?
856	6	27	3.2.006	No match

Index number	Form number	Item number	KCCT	NAEP
857	6	28	4.2.001	6b, 37b, 37e, 43a
858	6	29	1.1.003	6a
869	6	35	2.1.001	No match

Index Number	Form Number	Item Number	KCCT	NAEP
3584	1	1	1.1.006	2B, 2D
3585	1	2	1.2.002	4A, 3D, 4Bi, 4Bii, 4C, 4D, 4Fi
3586	1	3	4.1.003	No match
3587	1	4	3.1.001	29
3588	1	5	1.2.003	5B, 5A, 5C, 5D, 5E
3589	1	6	4.2.001	41C
3590	1	7	2.3.001	16
3591	1	8	1.3.003	*3B*[1]
3592	1	9	4.2.003	39A, 39C
3593	1	10	3.2.001	26A
3594	1	11	2.3.003	14, 21, 22C
3595	1	12	4.2.005	37B, 37C, 37D, 40A, 40B, 49
3596	1	13	4.2.002	40A, 40B
3597	1	14	3.2.003	27D
3598	1	15	2.2.005	10A
3599	1	16	4.2.005	37B, 37C, 37D, 40A, 40B, 49
3600	1	17	4.2.001	41C
3601	1	18	2.1.005	*12*
3602	1	19	1.1.002	*41A*
3603	1	20	1.2.003	5B, 5A, 5C, 5D, 5E
3604	1	21	3.2.006	*24, 34*
3605	1	22	4.3.001	37E, 38, 41D
3606	1	23	1.2.003	5B, 5A, 5C, 5D, 5E
3607	1	24	2.1.002	17A, 17B
3608	1	25	1.3.002	*3B*
3609	1	30	3.2.003	27D
3610	1	31	1.2.004	6C, 6D
2871	1	32	2.2.003	19A
2872	1	33	2.3.003	14, 21, 22C
2873	1	35	1.2.003	5B, 5A, 5C, 5D, 5E
2884	2	1	1.1.006	2B, 2D
2885	2	2	1.2.001	3A
2886	2	3	4.1.003	No match
2887	2	4	3.1.001	29
2888	2	5	3.2.006	24, 34
2889	2	6	4.1.001	No match
2890	2	7	2.2.005	10A

Index Number	Form Number	Item Number	KCCT	NAEP
2891	2	8	3.2.002	27A, 27B, 27C
2892	2	9	4.2.005	37B, 37C, 37D,
2893	2	10	3.2.002	40A, 40B, 49 27A, 27B, 27C
2894	2	11	1.1.003	No match
2895	2	12	2.2.007	*22B*
2896	2	13	2.2.001	*24*
2897	2	14	1.1.004	1A
2898	2	15	1.1.005	No match
2899	2	16	3.3.003	28A, 28B, 31A,
2900	2	17	4.1.002	31B 37A
2901	2	18	1.1.003	No match
2902	2	19	1.2.004	6C, 6D
2903	2	20	1.2.001	3A
2904	2	21	2.2.007	*22B*
2905	2	22	4.2.005	37B, 37C, 37D,
2906	2	23	4.1.003	40A, 40B, 49 No match
2907	2	24	2.2.004	No match
2908	2	25	2.2.005	10A
2909	2	30	1.2.001	3A
2910	2	31	2.2.003	19A
2911	2	32	4.2.002	40A, 40B
2912	2	33	3.2.003	27D
2913	2	35	1.2.001	3A
2924	3	1	1.1.003	No match
2925	3	2	1.1.005	No match
2926	3	3	1.2.004	6C, 6D
2927	3	4	4.1.001	No match
2928	3	5	1.1.005	No match
2929	3	6	4.1.001	No match
2930	3	7	2.2.004	No match
2931	3	8	1.2.004	6C, 6D
2932	3	9	4.1.003	No match
2933	3	10	3.2.002	27A, 27B, 27C
2934	3	11	2.3.001	16
2935	3	12	1.2.001	3A
2936	3	13	2.2.001	*24*
2937	3	14	1.1.004	1A
2938	3	15	1.1.005	No match
2939	3	16	3.3.003	28A, 28B, 31A,
2940	3	17	2.1.003	31B No match
2941	3	18	4.2.006	2D

Index Number	Form Number	Item Number	KCCT	NAEP
2942	3	19	1.2.001	3A
2943	3	20	1.2.003	5A, 5B, 5C, 5D, 5E
2944	3	21	3.1.003	No match
2945	3	22	4.3.001	37E, 38, 41D
2946	3	23	3.2.007	No match
2947	3	24	2.3.002	No match
2948	3	25	1.2.001	3A
2949	3	30	2.1.005	*12*
2950	3	31	2.2.003	19A
2951	3	32	4.2.002	40A, 40B
2952	3	33	3.2.003	27D
2953	3	35	4.3.001	37E, 38, 41D
2964	4	1	1.1.003	No match
2965	4	2	1.1.005	No match
2966	4	3	1.2.004	6C, 6D
2967	4	4	4.1.001	No match
2968	4	5	1.2.004	6C, 6D
2969	4	6	2.2.003	19A
2970	4	7	4.2.002	40A, 40B
2971	4	8	1.3.002	*3B*
2972	4	9	3.3.003	28A, 28B, 31A, 31B
2973	4	10	3.2.003	27D
2974	4	11	2.2.005	10A
2975	4	12	4.2.005	37B, 37C, 37D, 40A, 40B, 49
2976	4	13	2.1.004	21
2977	4	14	4.2.001	41C
2978	4	15	3.2.003	27D
2979	4	16	1.2.003	5A, 5B, 5C, 5D, 5E
2980	4	17	2.2.006	7, 8
2981	4	18	2.2.007	*22B*
2982	4	19	4.2.003	39A, 39C
2983	4	20	1.2.001	3A
2984	4	21	1.1.006	2B, 2D
2985	4	22	4.2.006	2D
2986	4	23	1.2.004	6C, 6D
2987	4	24	4.2.002	40A, 40B
2988	4	25	2.2.002	18
2989	4	30	4.2.002	38A, 38B
2990	4	31	2.1.001	No match
2991	4	32	3.1.003	No match
2992	4	33	1.1.006	2B, 2D

Index Number	Form Number	Item Number	KCCT	NAEP
2993	4	35	1.1.006	2B, 2D
3004	5	1	4.2.003	39A, 39C
3005	5	2	1.3.002	*3B*
3006	5	3	2.2.003	19A
3007	5	4	3.2.005	26B, 28C, 36A
3008	5	5	1.3.001	2E
3009	5	6	1.3.003	*3B*
3010	5	7	2.2.006	7, 8
3011	5	8	1.1.004	1A
3012	5	9	4.2.001	41C
3013	5	10	3.2.002	27A, 27B, 27C
3014	5	11	2.2.002	18
3015	5	12	4.2.005	37B, 37C, 37D,
3016	5	13	2.1.004	40A, 40B, 49 21
3017	5	14	4.2.001	41C
3018	5	15	3.2.003	27D
3019	5	16	1.2.003	5A, 5B, 5C, 5D,
3020	5	17	1.2.003	5E 5A, 5B, 5C, 5D,
3021	5	18	2.2.006	5E 7, 8
3022	5	19	1.2.001	3A
3023	5	20	1.3.003	*3B*
3024	5	21	3.3.001	26A
3025	5	22	1.2.002	26B, 28C, 36A
3026	5	23	4.2.001	41C
3027	5	24	2.1.003	No match
3028	5	25	4.3.001	37E, 38, 41D
3029	5	30	1.2.003	5A, 5B, 5C, 5D,
3030	5	31	2.2.001	5E *24*
3031	5	32	4.3.001	37E, 38, 41D
3032	5	33	3.2.003	27D
3033	5	35	2.2.002	18
3044	6	1	4.2.003	39A, 39C
3045	6	2	1.3.002	*3B*
3046	6	3	2.2.003	19A
3047	6	4	3.2.005	26B, 28C, 36A
3048	6	5	1.1.002	*41A*
3049	6	6	1.1.006	2B, 2D
3050	6	7	2.2.005	10A
3051	6	8	1.1.003	No match
3052	6	9	4.2.002	40A, 40B
3053	6	10	3.2.003	27D

Index Number	Form Number	Item Number	KCCT	NAEP
3054	6	11	2.2.005	10A
3055	6	12	1.2.001	3A
3056	6	13	4.2.002	40A, 40B
3057	6	14	3.2.003	27D
3058	6	15	2.2.005	10A
3059	6	16	4.2.005	37B, 37C, 37D,
3060	6	17	3.2.003	40A, 40B, 49 27D
3061	6	18	4.3.002	No match
3062	6	19	2.2.004	No match
3063	6	20	1.2.001	3A
3064	6	21	3.2.002	27A, 27B, 27C
3065	6	22	4.2.005	37B, 37C, 37D,
3066	6	23	3.2.001	40A, 40B, 49 26A
3067	6	24	2.2.006	7, 8
3068	6	25	4.1.001	No match
3069	6	30	1.2.003	5A, 5B, 5C, 5D,
3070	6	31	2.1.004	5E 21
3071	6	32	1.3.003	*3B*
3072	6	33	2.1.004	21
3073	6	35	4.2.005	37B, 37C, 37D,
				40A, 40B, 49

[1]Numbers in italics represent NAEP standards classified as close/unsure matches.